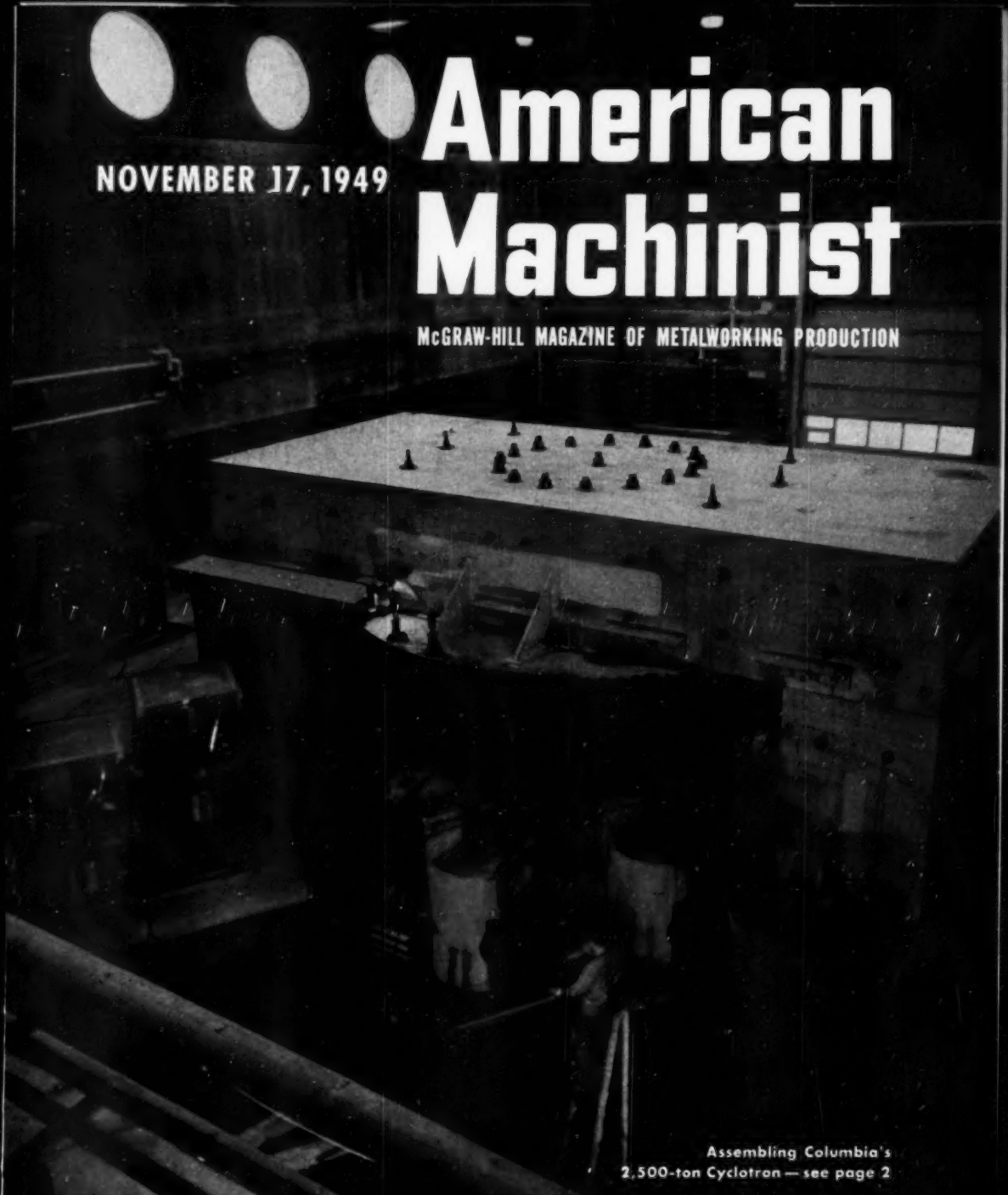
NOVEMBER 17, 1949

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Assembling Columbia's 2,500-ton Cyclotron — see page 2

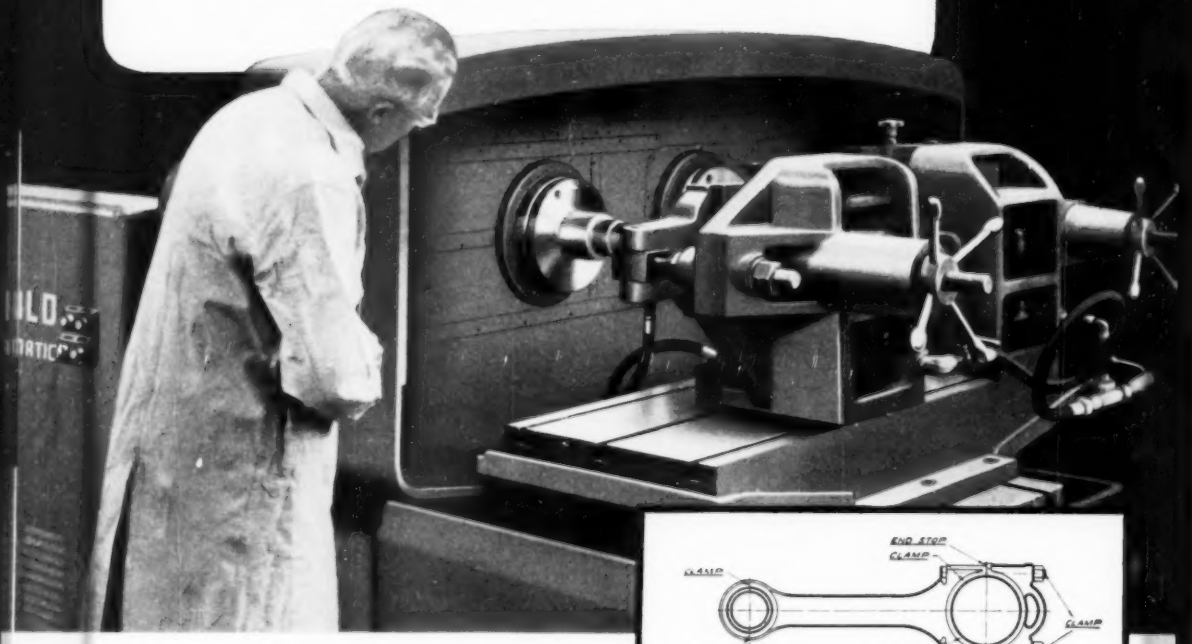
Modern Mechanical Presses—a special report •

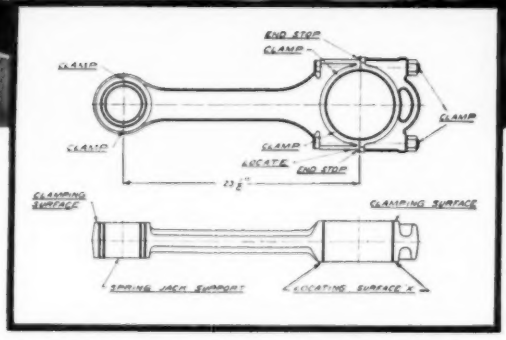
Secondary Operations •

How Large Diesel Conn Rods are Finished

FIVE TIMES FASTER

on the Big, New, Heald Model 521 Bore-Matic





Schematic drawing of a large diesel conn rod, showing surfaces borized as well as clamping and locating points.

Speed and precision are often just as important on large work as on smaller parts. And that's where the big, new Heald Model 521 and 522 Bore-Matics can really break bottle necks, cut costs, and improve product quality. Here's a typical example.

In this particular case the Heald Model 521 Bore-Matic shown above is used for borizing large diesel connecting rods — measuring two feet between centers of crank and wrist pin bores. Production records show that this high-speed, high precision machine does the job five times faster than was possible with previous equipment.

The parts are completely borized in two operations. First, the crank pin hole is semi-finished and the wrist pin hole is bored. Then a bushing is inserted in the wrist pin hole, boringhead quills are changed, and the second operation precision finishes both the crank end and the bushed pin end.

Remember — no matter how large the work (or how small), you can probably do it faster, easier and at lower cost on a new Heald Machine.

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Chips and QUIPS

Our Cover . . . Rapt scientists of nine nations are racing to discover the secrets of the atom. Their major tool is the cyclotron, which brings to reality the ancient alchemist's dream of transmuting one element into another. Nitrogen has been converted into oxygen, iron into cobalt, manganese into iron, and of course uranium 235 has been separated from uranium 238. The cyclotron bombards an atom with protons charged with the tremendous energy of say 400,000,000 electron volts, increasing protons of the atomic nucleus.

Columbia University, in cooperation with the Navy, is building one of the world's largest cyclotrons at Irvington-on-Hudson, N. Y. Our cover Kodachrome is the first color picture of it. This huge 2,500-ton unit contains a magnet built up of 38 carefully machined blocks of steel, weighing as much as 60 tons each. The magnet yoke (orange-yellow in our cover Kodachrome) was forged from giant ingots weighing more than 460,000 lb each. This rectangular assembly is 33 ft long and 21 ft high. Yoke top and bottom are each ten bolted plates 17 x 63 x 396 in., and weighing 60 tons apiece. Sides each comprise five plates 34 x 63 x 126 in., and weighing 38 tons apiece. Pole pieces (green disks in center) are 170 in. in dia, and will fire protons at a speed of more than 150,000 miles per second, very close to that of light. Pole pieces vary in thickness from 6 to 16$^3/_8$ in. and weigh up to 47 tons.

Bethlehem Steel Company made and machined the blocks at its Bethlehem, Pa., plant. Plates were squared from fluted round ingots in a 7500-ton steam-hydraulic press, then worked into desired shape with necessary reheating. All plates, except those for pole tips, were rough-machined and holes were drilled for assembly bolts. Pole-tip plates were finish-machined to close tolerances and fitted with intricate segment shims. Details are shown in an article in this issue.

Assembling the cyclotron was facilitated by installation of a special overhead crane. The cyclotron can be dismantled and its pole-tip piece changed if magnet characteristics are to be changed. All parts were shipped on special railcars and wartime tank carriers to this isolated building.

Toolmaking . . . J. R. Paquin continues his series on die design with an installment on spring strippers, and John R. Godfrey (our old friend, Fred Colvin) worries over the decline in skilled toolmakers as demand for them increases . . . Harold C. Andree, tool engineer of Westinghouse (Sunnyvale, Calif.), describes keyseater slotting of motor frames . . . John J. Meadows, consulting engineer, discusses special indicating gages developed to rematch 50,000 pots and covers mixed by mistake . . . And Chester Ricker tells how G. M.'s Diesel Division laps curved surfaces with a Gisholt flying-spindle machine.

Second Operations . . . Rarely written about, but vital cost-wise, are the second operations on rough-formed parts. Thomas J. Johnson, plant superintendent at Buick, tells some of the new ways of drilling, deburring and removing tits from screw-machine parts. He uses special machines and tools . . . Also for users of screw machines is an explanation by Walter E. Morgan, of Walter Kidde & Co., of an automatic extinguishing system for screw machines using light cutting oil.

Selling Tools . . . Machine tools must be sold to management on a cost basis. Further, the problems of national defense must be kept in mind. L. D. MacDonald, president of the National Machine Tool Builders' Assn. and vice-president of Warner & Swasey, presents a philosophy to help you.

Coming . . . We'll get into several tricky subjects in *A.M.* for Dec. 1. The Special Report will deal with automatic sizing on plain grinders, the result of a year's digging on the subject, during which several auto sizing devices were announced. This Report covers all known types . . . Then there's a lead article on transferring dimensions in millionths—a hitherto unsure process—and another article on working to 50-millionth clearances . . . In addition, there are articles on welding spinning tubs, on die springs, on machining tough alloys, on special handling hooks, on rearranging plant buildings, and on tool planning. All-in-all, it's a pretty busy issue.

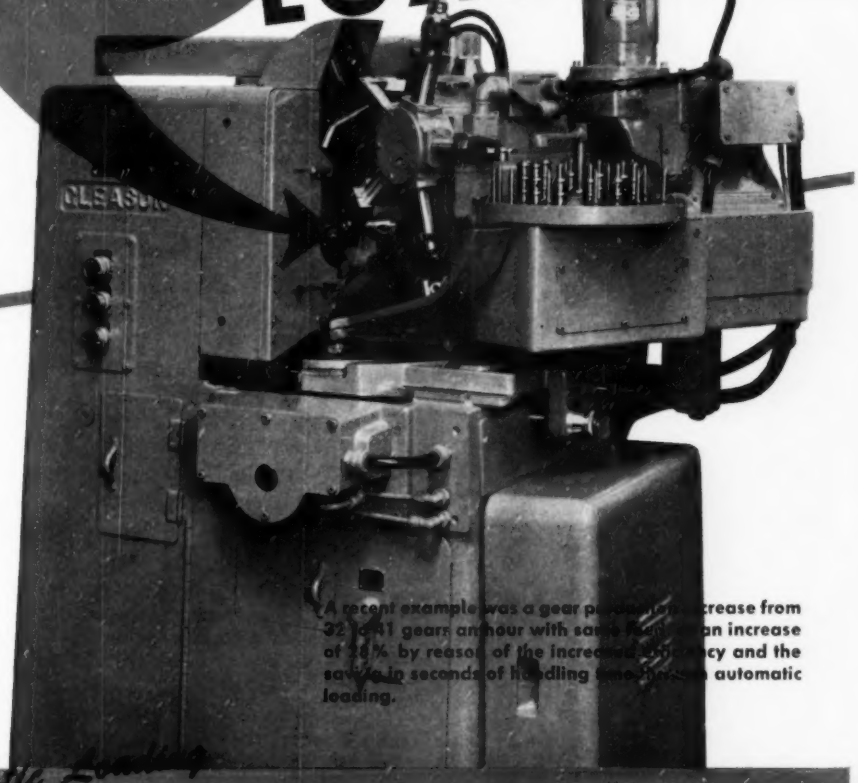
PRESS EXPERT . . . **Sergius D. Brootzkoos received his M.E. "cum laude" from The Institute of Technology in St. Petersburg (now Moscow), Russia, in 1914. Shortly thereafter, his Russian employer sent him to E. W. Bliss at St. Ouen, Paris, for training, then to Brooklyn. The revolution in Russia changed his plans, so he was with Bliss for more than 20 years, becoming an American citizen in 1925.**

During the depression, he standardized the Bliss line, then went on to do the same job for Clearing, followed by consulting work on armaments for France and Holland, a shift with the Ordnance Dept., then to the WPB as asst. chief of the Tool & Die Unit. In 1944, he shifted to FEA to rehabilitate Italian industry; in 1946 to War Assets, where he handled disposal of all metal-forming machines. He has written many articles and a book, "The Selection of Presses," published in 1941. From his years of experience, he provides us with our current Special Report

COUNT THE INCREASED OUTPUT THROUGH SECONDS SAVED

with

AUTOMATIC LOADING



A recent example was a gear p... crease from 32 to 41 gears an hour with sa... an increase of 28% by reason of the increa... cy and the saving in seconds of handling time ... automatic loading.

Automatic Loading

provides steady continuous production without needless "down time" for the machine . . . furnishes uninterrupted operation at peak efficiency with close control of actual cutting . . . produces high quality spiral bevel, Zerol bevel and hypoid gears. And . . . The machine can be used for short run work when the loader is not required.

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1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over Eighty Years

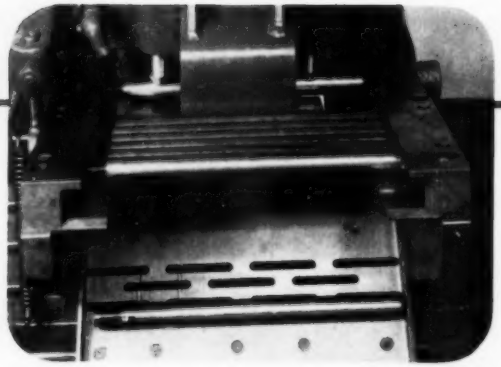
POSITIONING

CLAMPING

MILLING

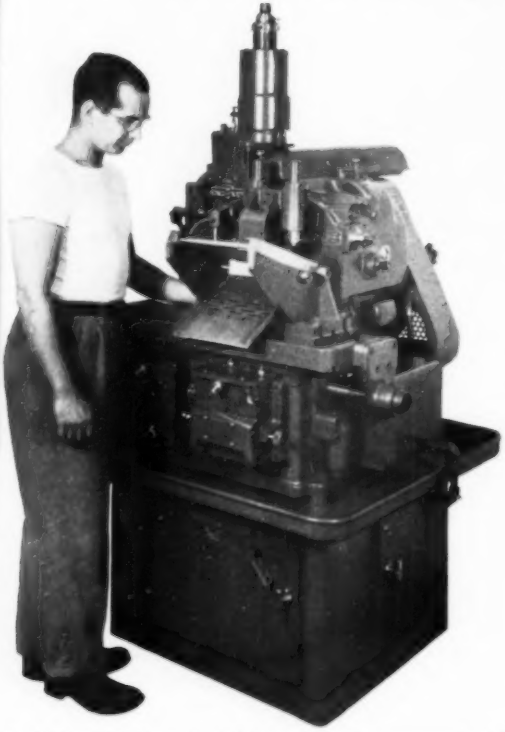
UNCLAMPING

EJECTING



Close-up of fixture, showing some of the parts in the loading magazine.

IT'S ALL AUTOMATIC



Keeping its appetite for work satisfied, the operator of this CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine fills the magazine feeding unit; there's nothing more for him to do except occasionally check the work.

Costs go down when degree of automatism goes up. And the man at the machine is more satisfied, too, because it means less physical effort for him. In the example shown here, practically everything is automatic. A CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine, with tooling by Cincinnati Application Engineers, mills Woodruff key seats in generator shafts at the rate of 250 per hour. The operator merely keeps the magazine loading device full; positioning, clamping, milling, unclamping and ejecting are automatic. ¶ Fully automatic milling can go a long way toward reducing the cost of high production milling operations in your shop. Our Application Engineers have the know-how to help you decide. Send blueprints of parts with complete details, to Department E. S.

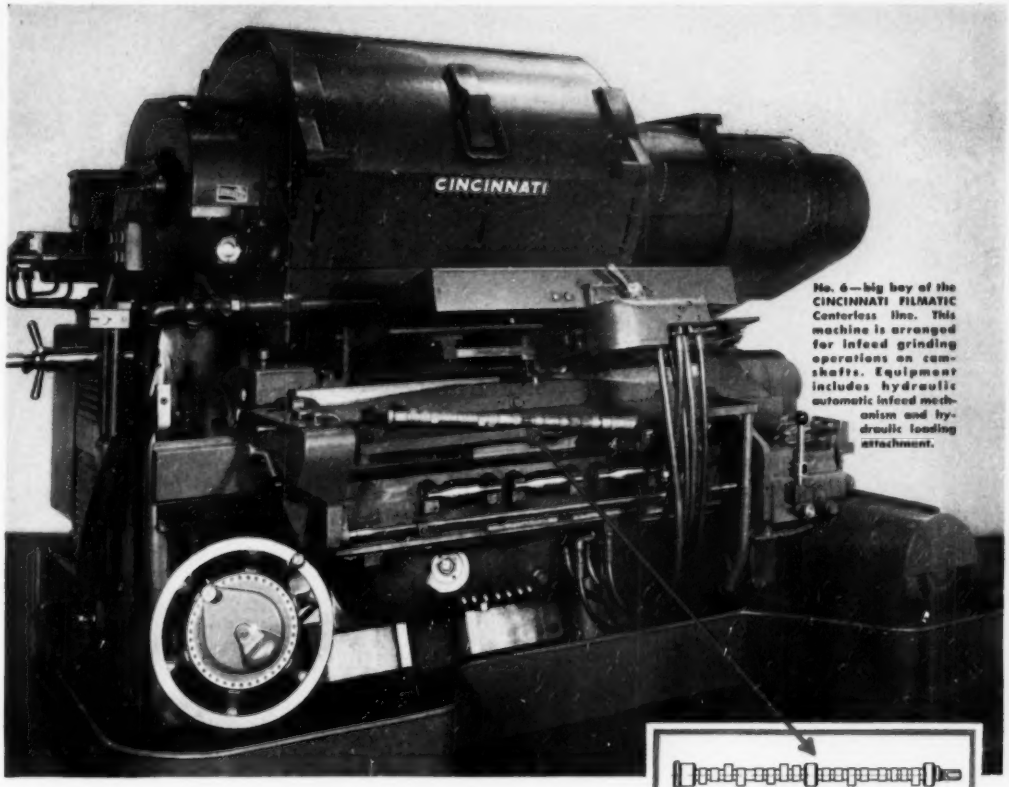
Drawing of part, with diagram of automatic milling cycle above it.

Part name	Generator shaft
Material	Steel
Operation	Mill Woodruff key seat
Production	250 per hour

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



No. 6—big boy of the CINCINNATI FILMATIC Centerless line. This machine is arranged for infeed grinding operations on camshafts. Equipment includes hydraulic automatic infeed mechanism and hydraulic loading attachment.

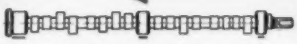
Direct from Foundry

TO 75 hp FILMATIC CENTERLESS GRINDER

A manufacturer of automobiles saves in three ways by routing camshafts direct from the foundry to a 75 hp CINCINNATI FILMATIC No. 6 Centerless Grinder:

1. Higher production and lower cost per piece than other methods, removing 1/8" on diameter
2. Accuracy of straightness retained
3. Close accuracy of alignment between three ground diameters

These machines, the most powerful of any centerless built, have the power and stamina to quickly grind away conventional stock allowances from rough castings. Of course, they are not limited to this type of work. They handle any precision cylindrical grinding operation requiring rapid stock removal and/or extra wide wheels, often replacing other methods. Our Grinder Application Engineers are at your service to help you investigate the cost reducing possibilities of these machines. Write to Department E. S., enclosing blueprint.



PRODUCTION DATA

Part name.....Camshaft
Material.....Castoloy
Operation.....Grind three main bearing diams. and pilot diam.
Method.....Infeed
Stock removal..... 1/8"
Production..... 34 per hour

MACHINE SPECIFICATIONS

SIZE No. 5

Capacity, diam..... 1"—7"
Maximum length infeed cut..... 32"
Grinding wheel..... 24" OD x 12" ID
Grinding wheel motor.....up to 75 hp
FILMATIC Grinding Wheel Spindle Bearings.

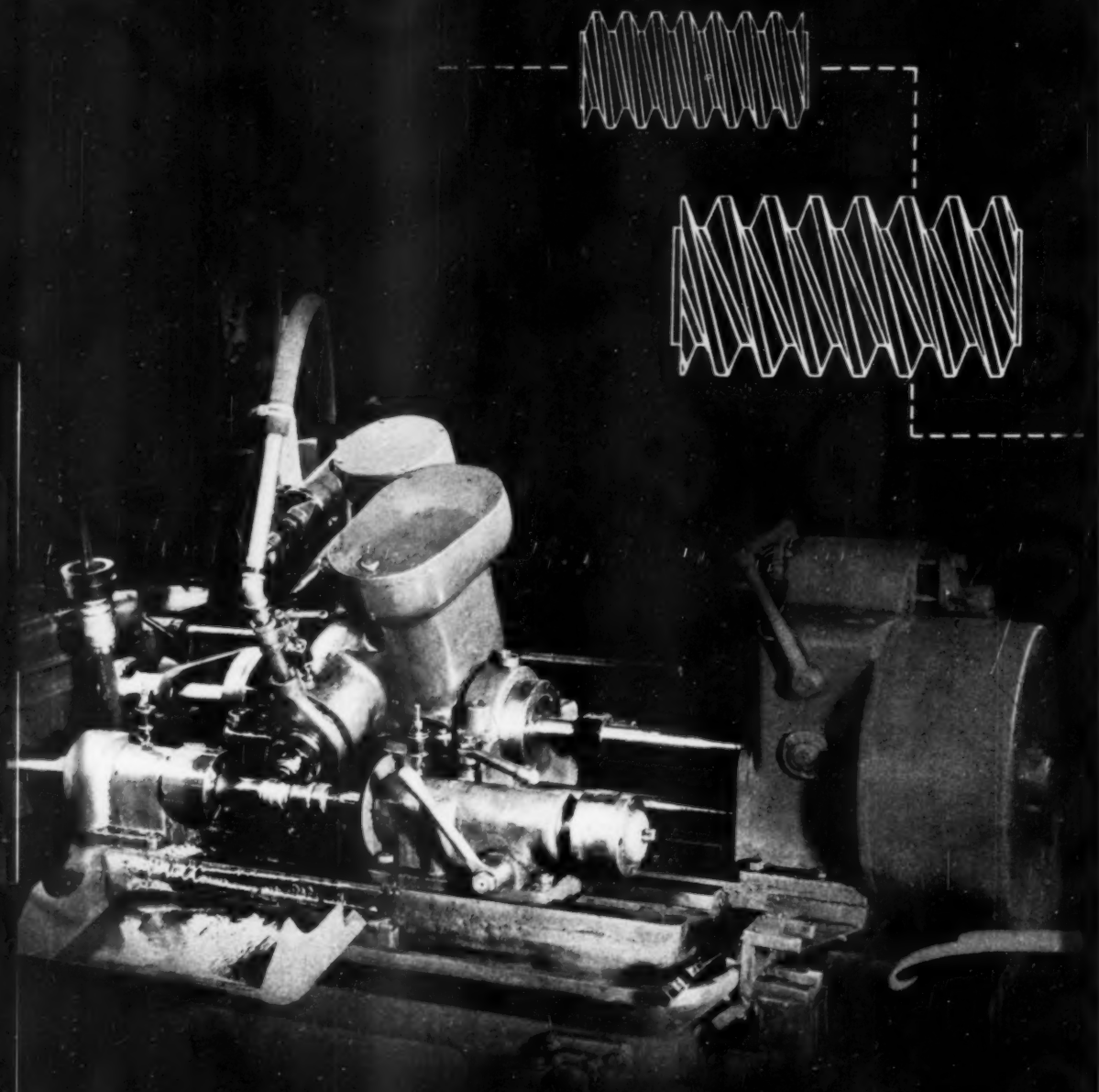
SIZE No. 6

Capacity, diam..... 1"—10"
Maximum length infeed cut..... 32"
Grinding wheel. 30" or 36" OD x 12" ID
Grinding wheel motor.....up to 75 hp
FILMATIC Grinding Wheel Spindle Bearings.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES



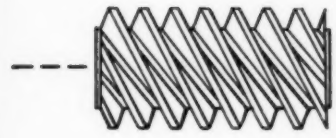
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

3 to 5 times FASTER
with the THREAD GENERATOR

Threaded work on a production basis is possible through the high-speed cutting and flexibility of the Fellows Thread Generator. Here is a machine that is truly a "cost saving specialist" in the production of threads and worms. Here is a typical performance:

Material cold rolled steel Outside dia. 1.775 Diametral pitch 24/48
Face width ..... 0.875" Straight worm, 20° pressure angle.
Five blanks mounted on arbor are cut at one time. One man runs 4 machines.
PRODUCTION: 59 WORMS PER HOUR! PER MACHINE



Single, double, triple or multiple thread "straight worms" . . . cut in one operation.

While producing worms at such high rates of speed, the finish is extremely smooth; accuracy of thread shape is inherent in the Fellows thread generator cutter, resharpened by simple face grinding.

Machines are built for work up to 4" O.D., 12" length. For more information on the production possibilities of the Fellows Thread Generator contact our nearest office.

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ON ALL MORSE CUTTING TOOLS

for Amazing Performance and Extra Tool Life

ELECTROLIZING is a proven process which increases tool life by fortifying the cutting edges with surfaces so smooth that friction is reduced . . . and chip-weld virtually eliminated. Tools hold size longer.

The MORSE ELECTROLIZING process obtains this extra tool life by two steps: (1) A treatment which raises the fatigue-point of the tool . . . and then, (2) A process, by which a new, hard . . . yet ductile alloy, .00003" to .00005" thick, is uniformly deposited on the cutting edges.

This proven ELECTROLIZING process . . . now a MORSE *exclusive* . . . means double . . . triple . . . or even greater tool life, for a slightly increased cost over that of regular MORSE Tools which can still be obtained. Specify MORSE ELECTROLIZED Taps, Dies, Drills, Reamers, Cutters and End Mills! Find out for yourself the amazing facts of ELECTROLIZED Performance, already proven to many large users of cutting tools. Your Morse-Franchised Distributor's salesman can help you with ALL your cutting tool requirements. Talk with him . . . for, now, more than ever, he's the top man to supply your cutting tool needs. Remember! YOU can *now* specify "MORSE ELECTROLIZED."

SOLD EXCLUSIVELY THROUGH MORSE-FRANCHISED DISTRIBUTORS

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASSACHUSETTS

A DIVISION OF VAN NORMAN COMPANY

BRANCH WAREHOUSES: NEW YORK • DETROIT • CHICAGO • SAN FRANCISCO

Here's what they say about *Electrolized* MORSE CUTTING TOOLS

"ELECTROLIZING gives almost doubled production between grinds.

"5 to 1 better tap life.

"Tap test shows better results 323 to 1.

"Former tap run was 5 to 500 pieces. Then the first ELECTROLIZED Tap ran 4,360 pieces.

"Increased tool efficiency is between 400–500%.

"We increased speed from 80 to 119 rpm and tapped 3,500 holes with no dulling of tap.

"Increased tool life 150% per grind.

"Used to get 3,000 holes per tap — now get 8,000.

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THIS IS A *MORSE* EXCLUSIVE: You can now specify ELECTROLIZED on all Morse Cutting Tools . . . and get longer tool life than you ever thought possible. Former premium charges considerably reduced. For full details, and prices, get in touch *today* with your Morse-Franchised Distributor.

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A DIVISION OF VAN NORMAN COMPANY

This advertisement also appears in leading industrial magazines . . . *backing up your sales effort.*

MORE JOBS PER

CUTTING-OFF

FLANGE JOINTS

THREADING

DOLLAR INVESTED

PIPE MACHINES DO MANY OPERATIONS FOR THIS TEXAS COMPANY . . .

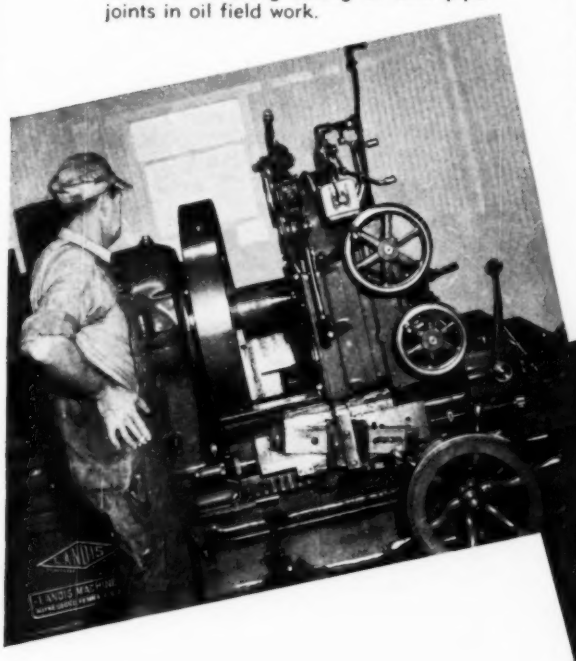
. . . . . saving handling, saving labor, saving machines . . . resulting in dollars saved and dollars earned for this production plant.

Illustrations show the **same** 13⅜" Landis Receding Chaser Pipe Threading and Cutting Off Machine performing three **different** operations.

CUTTING OFF—Casing is cut off, chamfered and then reamed.

THREADING—7" casing to A.P.I. tolerances, using a cutting speed of 18 surface feet per minute.

FLANGE MAKE-UP—Rear chuck is equipped with grips for making up joints and both the front and rear chucks are used for breaking casing or drill pipe joints in oil field work.



Besides handling a variety of different operations, as shown in this case history, the Landis Pipe Machines offer great versatility in threading operations alone. Each size machine handles a wide range of thread diameters. Within this range, and using the same set of chasers, the machine will cut threads of all diameters having the same taper, pitch and form. In addition, these machines are designed to cut tapered threads to precision tolerances. Accurate taper is assured by the sine bar feature, which causes the chasers to be withdrawn at a rate directly equal to the thread being produced.

Landis Pipe Threading Equipment can widen the gap between costs and selling prices in your plant. For complete details and specifications of Landis Pipe Threading Machines and Landis Tangential Chasers, write for Bulletin #C-77.

LANDIS

LANDIS Machine COMPANY

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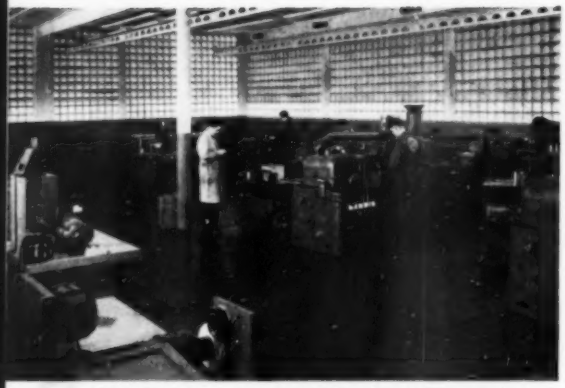


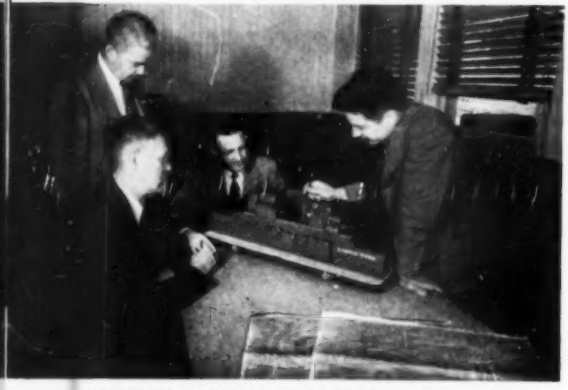
RESEARCH AND DEVELOPMENT—*Important reasons that keep LANDIS TOOL out ahead in grinding techniques and procedures today and tomorrow.*

LANDIS TOOL

Combines

*experience
modern plant
highly skilled workmen

. . . to offer you the



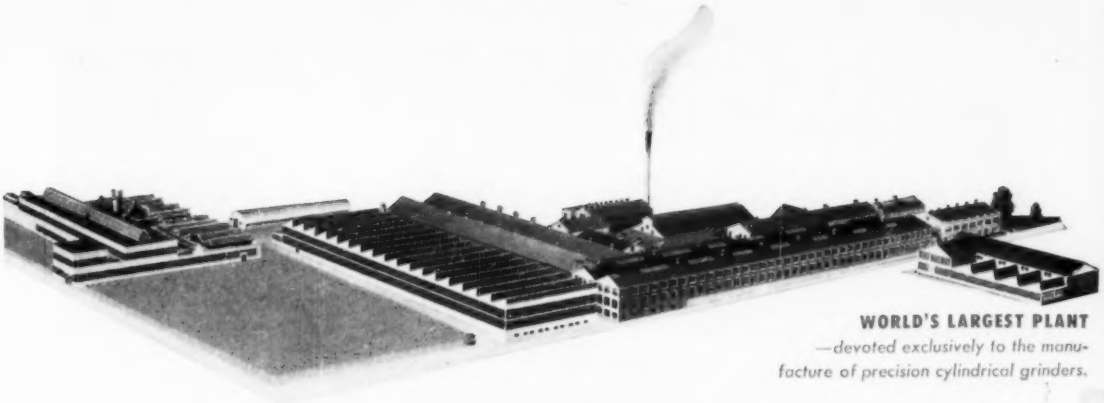
ADVANCED ENGINEERING PROGRAM—*New precision grinder designs studied by use of models. Experienced, practical and theoretical engineers make up this alert staff.*

PRECISION STARTS IN THE FOUNDRY—*A modern, well lighted foundry, rigid metallurgical specifications, stress relief by annealing castings in large furnace, provide a sound basis for machine precision.*

LANDIS TOOL

Precision Grinders

**Since 1889 when Landis Brothers started to manufacture precision cylindrical grinders.* LANDIS TOOL COMPANY *formed in 1897.*



WORLD'S LARGEST PLANT
—devoted exclusively to the manufacture of precision cylindrical grinders.

finest precision cylindrical grinders

MODERN MANUFACTURING METHODS—*Clean working conditions and modern equipment assure uniformity of machine parts.*

We invite you to visit . . .

and assure you a cordial welcome at the Landis Tool Company. From our methods and product you may gain time-saving ideas to put to work in your plant. Waynesboro is located in South Central Pennsylvania; only an overnight trip from any point east of the Mississippi. Company cars will be available to meet you at Harrisburg, Penna., Baltimore, Md., or Martinsburg, W. Va.

• Modern Facilities

Precision is controlled at every step in production by facilities that are complete in our plant—engineering, foundry, pattern shop, machining, heat treating, plating, assembly, testing. Production equipment is the latest and finest—fully mechanized foundry, modern machine tools, instrument controlled heat treatment, finest of measuring and checking equipment.

• Craftsmanship Tradition

Skill and craftsmanship are needed to build precision grinders that will work to extremely close tolerances and finishes of 1 to 2 micro inches. LANDIS TOOL has the tradition of craftsmanship today with assurance of having it tomorrow—located in a small Pennsylvania Dutch community—60% of the employees with 10 years' service or more—a nationally recognized apprentice training program—father-son craftsmanship tradition in many families—wide employee stock ownership—local ownership and management.

• Engineering Leadership

A large, well manned engineering department, plus an active development laboratory, assures engineering leadership. Some of the many LANDIS TOOL grinding firsts are:—

flood cooling of work
hydraulic operation of wheel feed and traverse
long life, large diameter grinding wheels
controlled clearance Microsphere Bearing for wheel spindles
Centerless Thread Grinders

LANDIS TOOL COMPANY, WAYNESBORO, PENNA.

4" OF CAST STEEL REMOVED IN MILLING . . . . . BORE LOCATIONS HELD TO ±.001"

G & L Machine Used for Both Heavy Milling and Accurate Boring of 34-ton Part

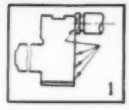
Here's another interesting example of machining extremely heavy parts. This 34-ton cast steel hydraulic press cylinder is completely machined in 3 settings. The machine used is a G & L No. 570 Floor-type Horizontal Boring, Drilling and Milling Machine with a 7" diameter spindle. The part is stationary and mounted directly on parallels on the floor plate. Bores are located by adjusting the column on the runway and the headstock on the column. The operator does this with ease through the use of electrical push-button controls located on the machine headstock.

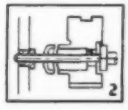
G & L Telescopic Vernier Sight Simplifies Locating Bores Accurately

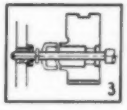
The machine is provided with a G & L Telescopic Vernier Sight which makes it possible for the machine operator to make settings in thousandths, *of both the headstock and column,* without leaving his operating position on the platform. This telescopic sight can be installed on any machine of this type which has scales and verniers. Write for Bulletin VS-4.

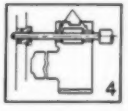
G & L machines are being used for an endless variety of machining operations on both small and large parts in many industries. With G & L attachments and accessories there is practically no combination of operations that cannot be performed with speed and economy. Feeds and speed ranges cover practically any cutting requirements.

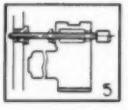
G & L engineers will be glad to make recommendations for faster machining of your work on G & L equipment.

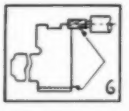


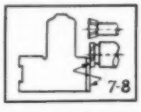


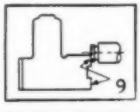












VERSATILITY FOR HEAVY DUTY AND ACCURATE MACHINING

1st Set-up

Set casting on parallels mounted on floor plate.

OPERATION 1—Face mill.

OPERATION 2—Pick up center bore and record vernier readings of headstock and column runway.

Bore, counterbore, chamfer 8"—38¾" and 39¾" diameter bores.

OPERATION 3—Backface 8" bore with Continuous Feed Facing Head mounted on bar.

OPERATION 4—Pick up, bore and chamfer three 15.437" holes and two 18" diameter holes, using scales and verniers on head and column runway.

OPERATION 5—Backface two 18" bores with Continuous Feed Facing Head before pulling bar out of the bores.

OPERATION 6—Take locating cut on pads to accurately establish their dimensions from the center bore. The reading of the headstock vernier will be the center bore reading, plus or minus, the distance the pad is from the center bore, plus ½ the diameter of the end mill used.

2nd Set-up

Set up on finished face on floor plate, aligning from the finished part of the pads.

OPERATION 7—Face mill pads.

OPERATION 8—Form mill inside edges of pad. (15° Dovetail Slide.)

3rd Set-up

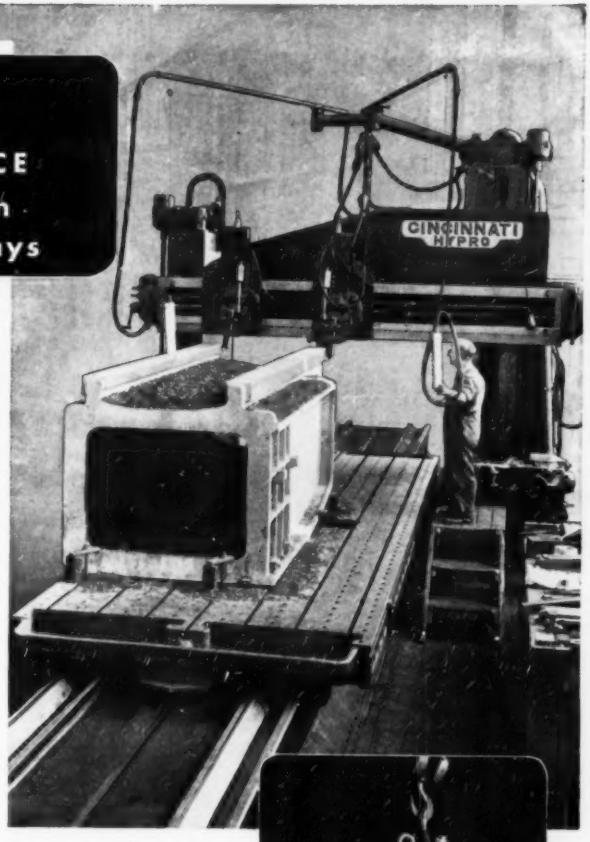
Reverse casting, again, aligning from finished pads.

OPERATION 9—Mill pads similar to Operation 7.

GIDDINGS & LEWIS MACHINE TOOL COMPANY
FOND DU LAC, WISCONSIN, U. S. A.

- **PARALLELISM**
- **FLATNESS**
- **CENTER DISTANCE**

held to .001" on 202" column ways



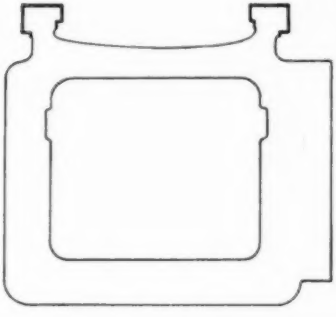
7 Bearing Surfaces on Each Way Require 30 Separate Cuts . . . 2 Heads Operate Simultaneously to Reduce Overall Planing Time . . . Job Completed in 17 Hours on Cincinnati Openside Planer

Bearing Ways on this huge machine tool column obtain their basic accuracy through planing. Parallelism throughout 202" length on top, sides and bottom, flatness on bearing widths and center distance relationship are maintained at .001". This unusually close machining requirement is essential to insure final working accuracy of the assembled machine tool.

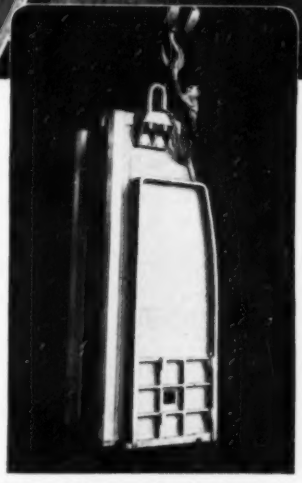
You can depend on Cincinnati Planers to produce both finish and accuracy needed for heavy, cumbersome parts such as this column, or for relatively shallow, fragile work where warpage or distortion may create a problem.

Two Cutting Heads Operate Simultaneously On Each Bearing Way

The line drawing shown below indicates the finish surfaces required to complete the bearing ways. Two heads on the rail operating from separate feed screws speed the overall planing time on this part. In addition, dimensional relationships are held on all seven bearing surfaces with each other and with each way.



Planing large or small parts, as a single unit or in multiples, may easily mean added profits for you. Check now with Cincinnati Planer engineers for their recommendations.



Box type bearing ways on this huge column are planed on four sides.

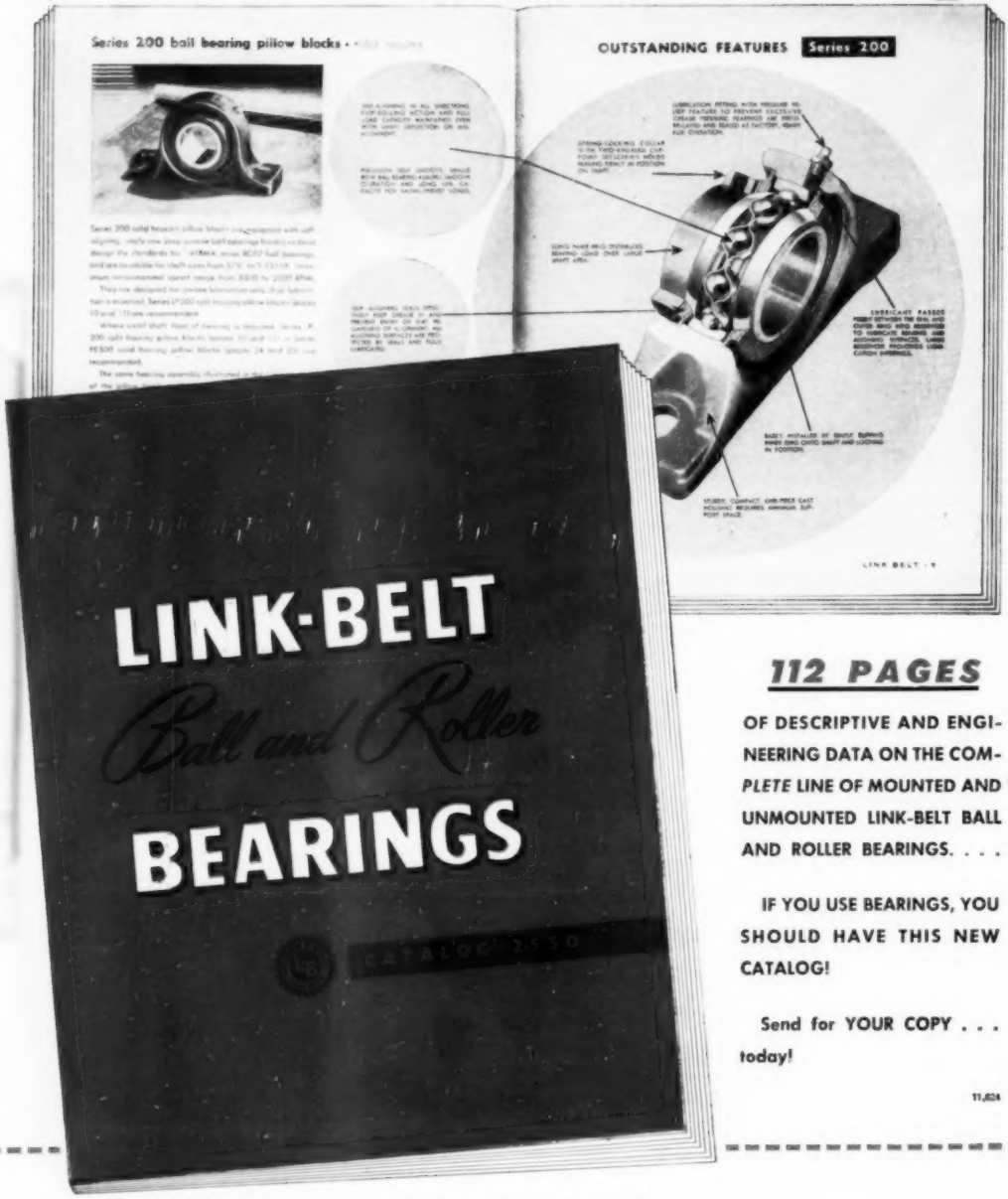
THE CINCINNATI PLANER COMPANY

(SUBSIDIARY OF GIDDINGS AND LEWIS MACHINE TOOL COMPANY)

CINCINNATI 9, OHIO, U. S. A.

HYPRO

YOUR COPY is Ready!



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OF DESCRIPTIVE AND ENGINEERING DATA ON THE COMPLETE LINE OF MOUNTED AND UNMOUNTED LINK-BELT BALL AND ROLLER BEARINGS. . . .

IF YOU USE BEARINGS, YOU SHOULD HAVE THIS NEW CATALOG!

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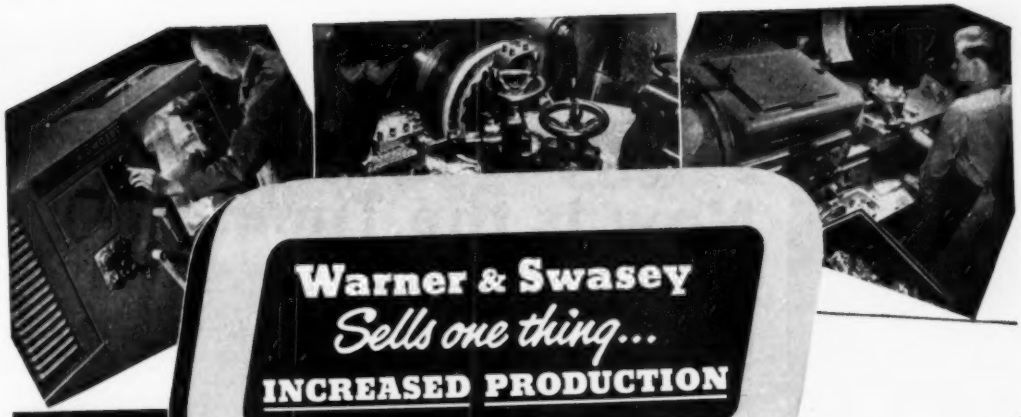


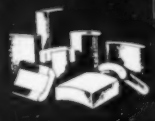
Warner & Swasey
Sells one thing...
INCREASED PRODUCTION

Taken from our field report files.

- One part, formerly produced in six minutes, is now turned out in 55 seconds on the new No. 3 Electro-Cycle at the AMERICAN MACHINE AND METALS COMPANY, East Moline, Illinois.
- STAINLESS ENGINEERING AND MACHINE WORKS, DIVISION OF COOPER ALLOY FOUNDRY CO., Hillside, New Jersey, report their Warner & Swasey 1-AC Single Spindle Automatic cut time needed to machine a stainless steel valve nut with carbides, from 4.5 minutes to 1.4 minutes.
- A Warner & Swasey No. 4 Universal Turret Lathe installed last February at COMBUSTION ENGINEERING-SUPER-HEATER, INC., Plant No. 2, Chattanooga, Tennessee, has paid for itself in the first ten months on savings in direct labor costs alone.
- Production of aluminum valve bodies and covers at BRYANT HEATER DIVISION, AGE, INC., Cleveland, was increased 4 to 1 over previous methods when a new Warner & Swasey No. 11 Precision Tapping and Threading Machine was installed.
- For ordinary brass work, the new 16" Electro-Cycle at AMERICAN STERILIZER, in Erie, is 70.5% faster than their old plain head machines, and on complicated jobs, production increases up to 121.1% have been shown.
- THE BADGER METER MANUFACTURING COMPANY, Milwaukee, report their Warner & Swasey 5-Spindle Automatic Chucking Machine is increasing production 5 to 1 over previous methods including setup time.

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE AND SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES . . .



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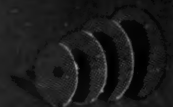
Skillful Engineering *backed by* Progressive Research

Adequate Stocks • • Strategically Located



CUT-OFF WHEELS

Grinding Wheel Costs . . .

Norton Product "Know-How" and Application "Know-How" Can Do It for You

Now, more than ever, it is absolutely essential to get grinding, polishing and other abrasive costs down to rock bottom—down below that dangerously high "break-even" point. *And Norton "know-how" can help you do it.*

Skillful Engineering Backed by Progressive Research

Norton abrasive engineers are highly trained men—experts who can come right into your plant and specify a cost-cutting grinding wheel or abrasive for each of your jobs. Back of them are the engineers from the Worcester plant, each a specialist on a particular type of grinding or use of abrasives. And supplementing these Norton engineers there are more than 2000 distributor men the country over—a large percentage of them factory-trained by Norton.

To make sure that Norton engineers have available the very best grinding wheels and other abrasive products to solve your problems, a staff of 135 scientists and technicians is constantly at work in the Norton Research Laboratories. It is the efforts of these men which have brought forth the many important Norton developments such as 32 ALUNDUM abrasive—the sensational, single crystal abrasive which is cutting grinding costs in thousands of plants.

Adequate Stocks—Strategically Located

When the correct wheels for your jobs have been determined, they are handy to you—on the shelves of Norton distributors in over 225 cities of the United States. And these local stocks are carefully selected to meet the particular needs of each individual area. Back of these distributor stocks are the Norton branch warehouses in five important industrial centers and supporting them are the gigantic stock rooms at the mile-long Worcester plant.

Take advantage of Norton "know-how" to cut your abrasive costs. Call in your Norton abrasive engineer or your local Norton distributor—you will find him listed under "grinding wheels" in your classified telephone directory.

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(Behr-Manning, Troy, New York, is a Division of Norton Company)

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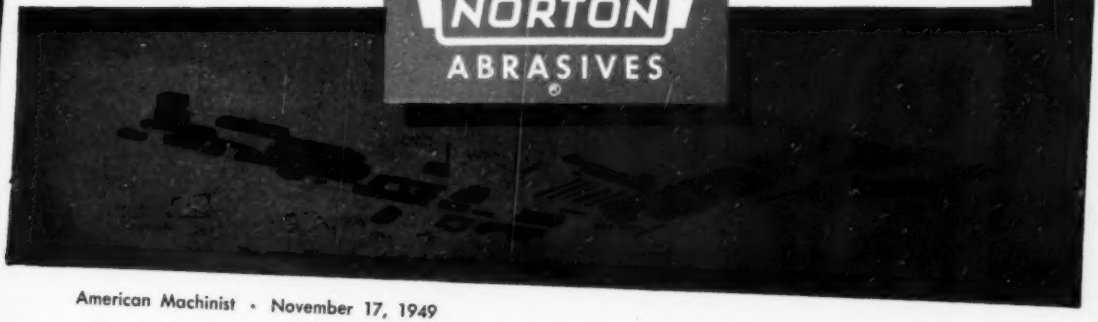
NORTON ABRASIVES



TEAMWORK

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The smooth operation and easy handling of "American" Radials give them front rank recognition amongst users as dependable producers of accurate and finely finished work.

The directly connected, head mounted motor guarantees maximum power at the spindle.

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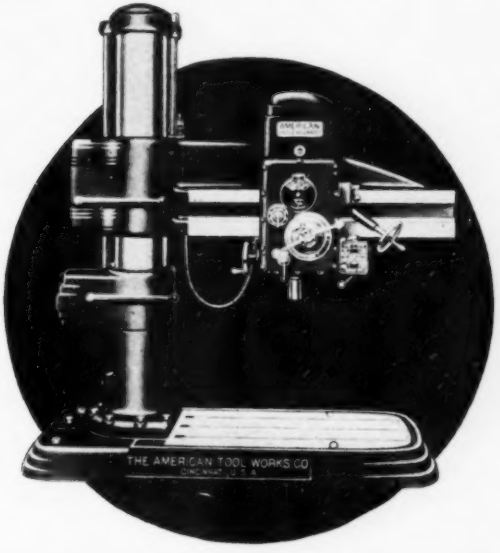
For quality work at a profit your best bet is "AMERICAN".



Lathes and Radial Drills **Cincinnati, Ohio U.S.A**

Several folders on Sterling's Research and Development Program are available. Send for them.

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WHERE SCIENTIFIC MAKES CERTAIN

STERLING'S RESEARCH AND DEVELOPMENT TECHNIQUE

New applications, new designs, new combinations of grains and bond, new searches for better performance and longer life constantly demand the attention of Sterling's laboratory technicians.

Working in groups, not singly, creates an exchange of ideas that often results in new "Wheels of Industry" to do your unusual, unexpected grinding job faster and with greater accuracy.

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Sterling's New Research and Development Program, geared to today's needs, is solving grinding problems which only two or three years ago would have been considered impossible. This service is available to any grinding department . . . . is back of every "Wheel of Industry" you use. A Sterling engineer will explain it fully upon request—no obligation.

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FIRST STEP The used wheel's blotter has been lost. Result—no data to use for reordering. The Sterling engineer takes the wheel for analysis.

SECOND STEP The wheel of unknown specification is taken to the Sterling laboratory for complete checkup and study.

THIRD STEP Various laboratory tests provide positive evidence of the grain proportion, density and bond content and suggest methods of procedure.

FOURTH STEP The result of the laboratory investigation is an improved wheel which the Sterling salesman proudly hands to the operator.

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Since 1885, Manufacturers of "The Wheels of Industry"

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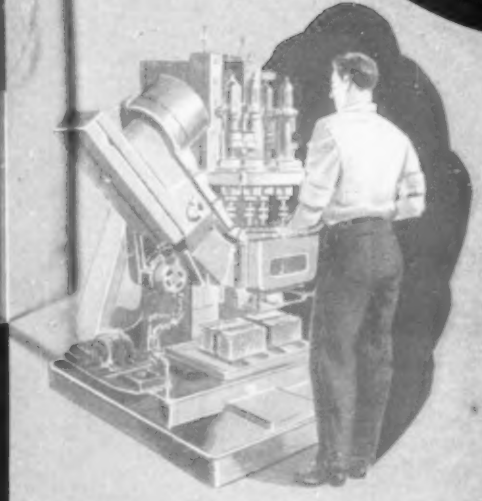
WINTER

TAPS IN ACTION



WINTER STRAIGHT SHANK TAPPER TAPS are recommended for fast, clean, high quantity production in nut tapping machines. They are furnished with plain round shanks at regular prices, and are also available with squared end, Acme Type "C", or National Interchangeable Ring Lock shanks at additional cost. In carbon steel, they are stocked in fractional sizes from ¼" diameter to 1½" diameter, and in machine screw sizes from Screw Gauge No. 4 to No. 12—all with cut thread only. In high speed steel, they are stocked in fractional sizes only, from ¼" diameter to 1" diameter, with choice of cut thread or commercial ground thread. Winter also manufactures bent shank tapper taps, and a complete line of other taps, including hand, chip driver, machine screw, nut, pipe, pulley, and stove bolt taps, as well as a full selection of dies.

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

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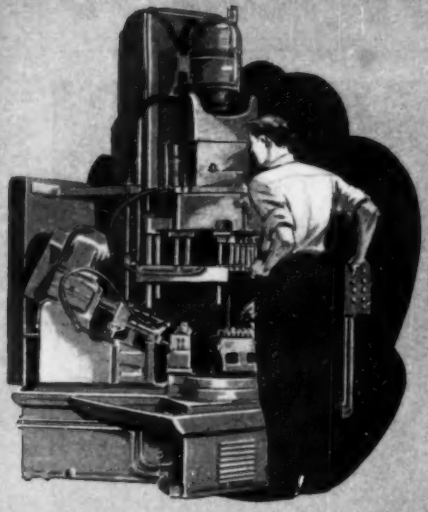
NATIONAL METAL CUTTING TOOLS

ON THE JOB



NATIONAL INTERCHANGEABLE COUNTERBORES are rugged, efficient, and adaptable. The simplicity of design of the spline-taper drive is one of its best recommendations. Taper shank and socket for alignment and rigidity; spline keys for jam-proof and twist-proof performance—that is all there is to it. Equal ruggedness, positive driving, and accurate alignment are obtained in the spline drive of **NATIONAL INVERTED SPOTFACERS.** Pilots fit snugly in the cutter; driving is accomplished through splines that are part of the pilot, bearing against slots in the cutter. The cutter is retained by solid shoulders on the pilot, yet removal is easy. National also makes solid counterbores, and a full line of standard and special rotary metal cutting tools, including twist drills, reamers, milling cutters, end mills, hobs, and special tools.

NATIONAL TWIST DRILL & TOOL CO. ROCHESTER, MICH., U.S.A.

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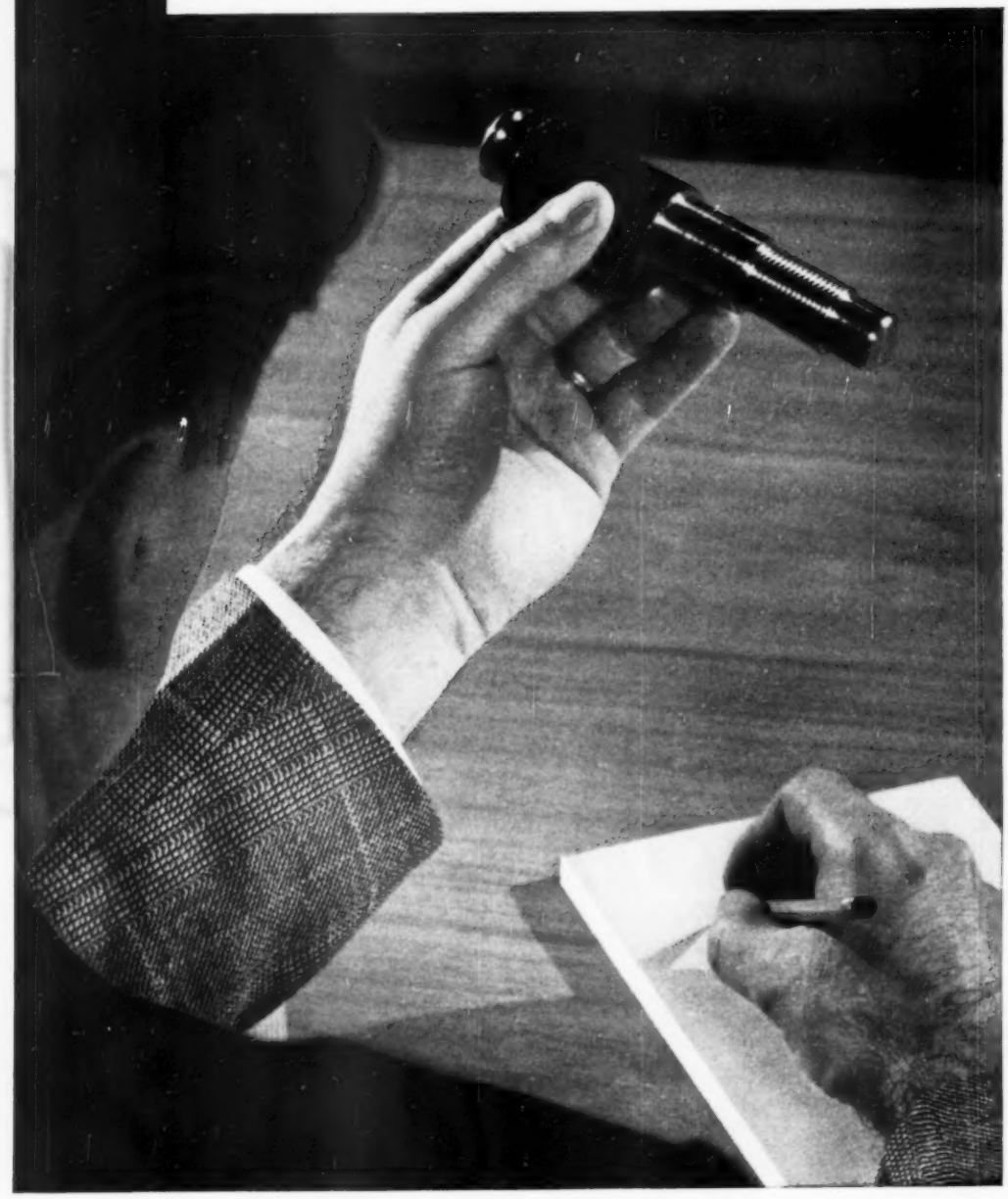
When you're told to



"Sharpen your Pencil"...

—you'll need this improved

MACHINABILITY

. . . because the MACHINABILITY of the steel bars you use, probably more than any other single factor, can help you whittle steel parts costs down to lowest obtainable levels. This is particularly true in parts where the cost of machining approaches the cost of the steel used.

Recognizing the vital importance of MACHINABILITY, Union Drawn Metallurgists and Engineers have spent many years in laboratory, mill and customers' plants studying the intricacies of this important factor. They have acquired an unequalled knowledge of MACHINABILITY, which through constant application in the production of Union Cold Drawn Steels now brings you:

1. **Top ratings on speeds and feeds**
2. **Uniformity of Machinability—bar after bar**
3. **Smooth, bright machined surfaces**
4. **Freedom from abrasive elements**
5. **Longer tool life—fewer grindings**
6. **Higher production efficiency**
7. **Increased output**
8. **Lower unit production costs**

Union Drawn Metallurgists are well qualified to help you "sharpen your pencil" on costs. They can show you how to use Republic Union Drawn Bessemer, carbon, alloy and stainless steels to best advantage—quality-wise as well as cost-wise. Through Union Drawn's complete facilities for furnace treatment—annealing, normalizing, stress-relieving and spheroidizing—they may be able to help you effect even greater economies. Write for further details.

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•
Union Cold Drawn Special Sections
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Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting.)

See what they did with U·S·S Free-Machining MX

If you're looking for ways to increase production and reduce costs on machined steel parts, this typical production run of U·S·S Free-Machining MX Bar Stock deserves your careful consideration.

U·S·S Free-Machining MX Bar Stock—today's fastest-cutting Bessemer Screw Stock—has been available to the screw machine industry for only a short time, but, in many other production-run tests like these, its ability to boost production, improve product finish, to maintain closer dimensional accuracy, reduce rejects and prolong tool life has been amply demonstrated. These results merely confirm what exhaustive laboratory tests covering a period of five years had led us to expect.

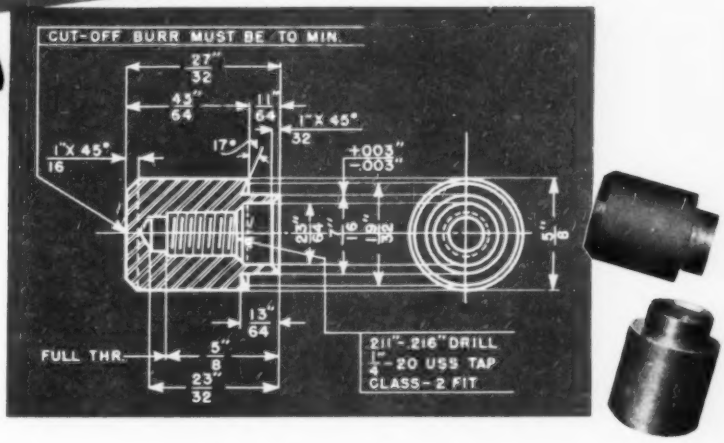
Why not find out how this new free-cutting bar stock works on your equipment? It may be just what you need to improve your product quality or to cut your costs. You can obtain U·S·S Free-Machining MX in cold-finished bars from your regular supplier. In hot-rolled bars, MX is available through our nearest district sales office. A qualified metallurgical representative will gladly discuss its possibilities with you.

USS

Bar Stock on these drum nuts . . .

. . . INCREASED TOOL LIFE 96%

OPERATING AT 345 SURFACE FEET PER MINUTE*



HERE'S THE JOB

The part produced is a 1/4" drum nut, four of which are swaged to the top of grease drums so that pump can be attached. Part is made from cold-drawn 5/8" round screw stock. Machine used is a four-spindle 7/8" R Acme-Gridley Automatic.

(Parts were produced by Screw Machine Specialties Co., Pittsburgh. Material furnished in cold-drawn form by the Wyckoff Steel Co.)

SEQUENCE OF OPERATIONS

FOURTH POSITION	**Feed Stock** **23/64" drill** **Finish form tool**
FIRST POSITION	**#3 (.214") drill** **Rough form tool**
SECOND POSITION	**Turning tool** **#3 (.214") drill** **Breakdown tool**
THIRD POSITION	**1/4" tap** **Cut-off tool**

NOTE: Although this was a production test run of material, operating conditions were set so that the machine would operate exactly as in regular production. All elements—speed, tool and machine conditions—were carefully standardized so that they were identical for both steels. The same operator was used throughout. Results tabulated here are the average obtained, not from just a few bars, but from a substantial number of regular production runs.

HERE ARE THE RESULTS

Material	Seconds per Part	Output Rate per Hour	SFM	RPM	Drill Feed	Tool Life	Parts per Tool change**
Reg. B-1113	3.17	1135	285	1719	.0078"	8.0 hrs	6,356
U·S·S MX	2.86	1260	345	2110	.0078"	13.5 hrs	12,493

**(Based on 70% efficiency)

* As is evident from the above, U·S·S MX when run at 21% greater speed than regular B-1113 materially increases production and almost doubles output per tool grind. Even at the unusually high machine speed of 381 SFM, when output increases 16.2%, tool life still remains greater than for that of regular B-1113 run at 33% slower speed.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH AND CHICAGO · COLUMBIA STEEL COMPANY, SAN FRANCISCO · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM

UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

25 times longer life

Talide
(TUNGSTEN CARBIDE)

Centerless Blades

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DRAWING DIES

CUTTING TOOLS

DRILL JIG BUSHINGS

ROLLING MILL WORK ROLLS

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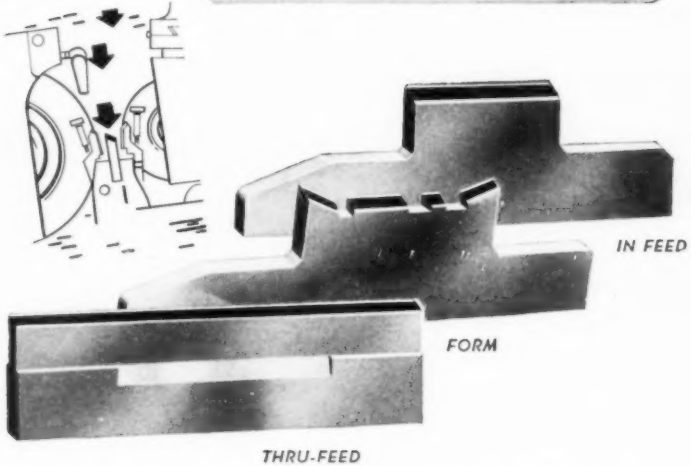

● Talide Tungsten Carbide Blades outwear cast iron, tool steel or hard-faced blades by at least 25 to 1. On most applications, Talide stays on the job 50 to 75 times longer than other blades.

This longer service life means continuous operation with the advantages of less scrap, less down time and lower unit cost. Remember, too, the Talide Carbide insert is a solid strip without sections or lines or seams to score the work. In addition to standard blades, we design and manufacture form or step blades for use in grinding parts with multiple diameters, steps, tapers, contours or other special shapes. *Forward part or drawing for estimate.*

Talide Blades and other standard Talide products (tools, dies, etc.) are available from stock from the following warehouses:

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Youngstown, Ohio, 107 E. Indianola Ave.
Detroit, Mich., 6432 Cass Ave.
Chicago, Ill., 601 W. Milwaukee Ave.

★ For the full story on longer service life of Talide Centerless Blades, ask for Catalog 48-WP, complete with prices, sizes and specifications.

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YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

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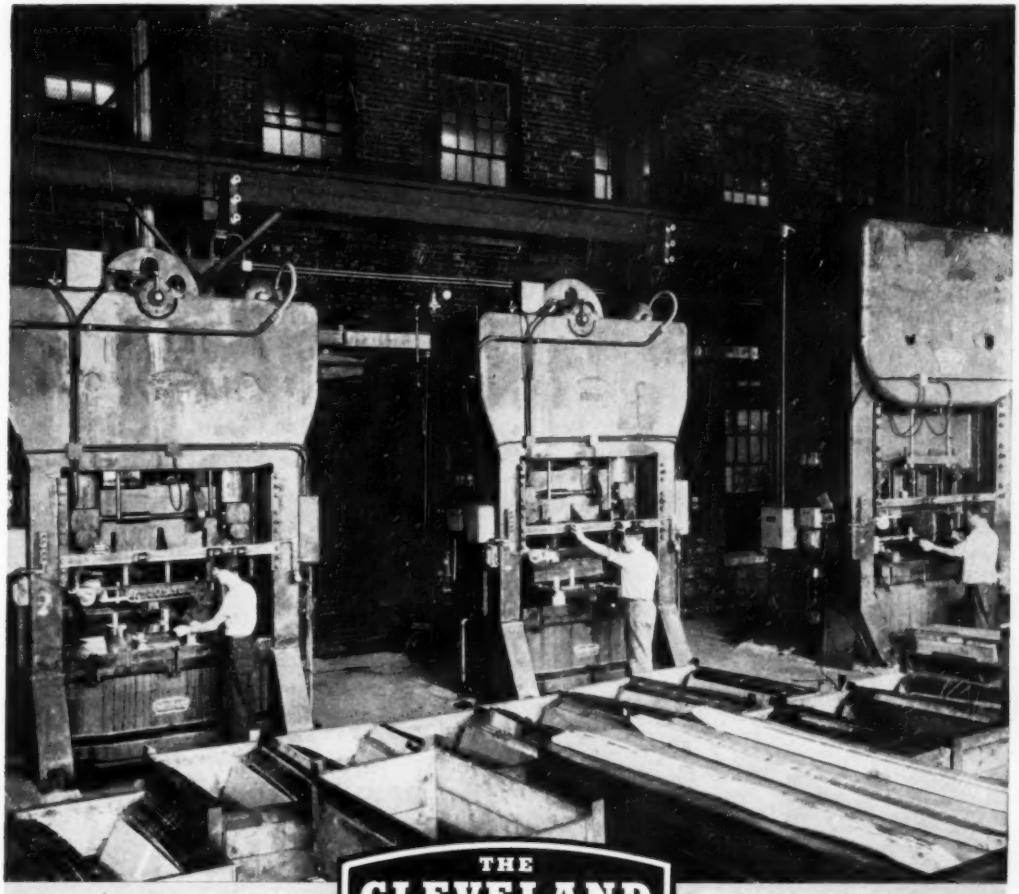
If you are interested in lower production costs, be sure to investigate the numerous advantages offered by Modern Cleveland Presses. High production rate, ease of operation, constant accuracy and minimum maintenance costs are assured by sound designing and rugged construction. The various types of Modern Clevelands are made in a wide range of sizes and capacities. If, however, you have special requirements our engineers will gladly work with you to arrive at the most effective solution. Write or call today for bulletin 11-4.



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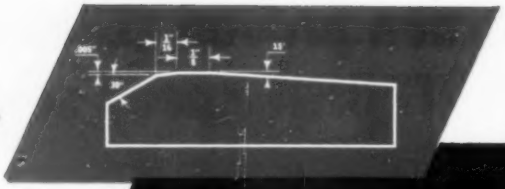

MEANS LONGER TOOL LIFE REAMING SOFT MATERIALS

Soft steel tubing, stringy and tough, is no match for Barber-Colman Reamer life on this job. First of all the right chamfer and back taper for reaming this material produces a tool that removes the chips "free and easy", leaving the quality of finish desired.

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JOB FACTS

Operation — Ream Axle Bushings
Material — Soft Steel Tubing
Stock Removed — .020"
Tool Life — 150 pieces per sharpening
Accuracy — Size within .0015"
Finish — Smooth, free from marks

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Write for additional Data Sheets covering other reaming applications and performance figures. Ask for Series No. 5147.

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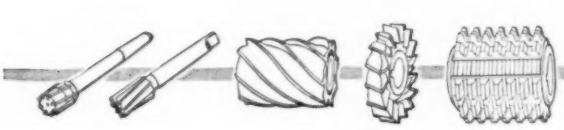
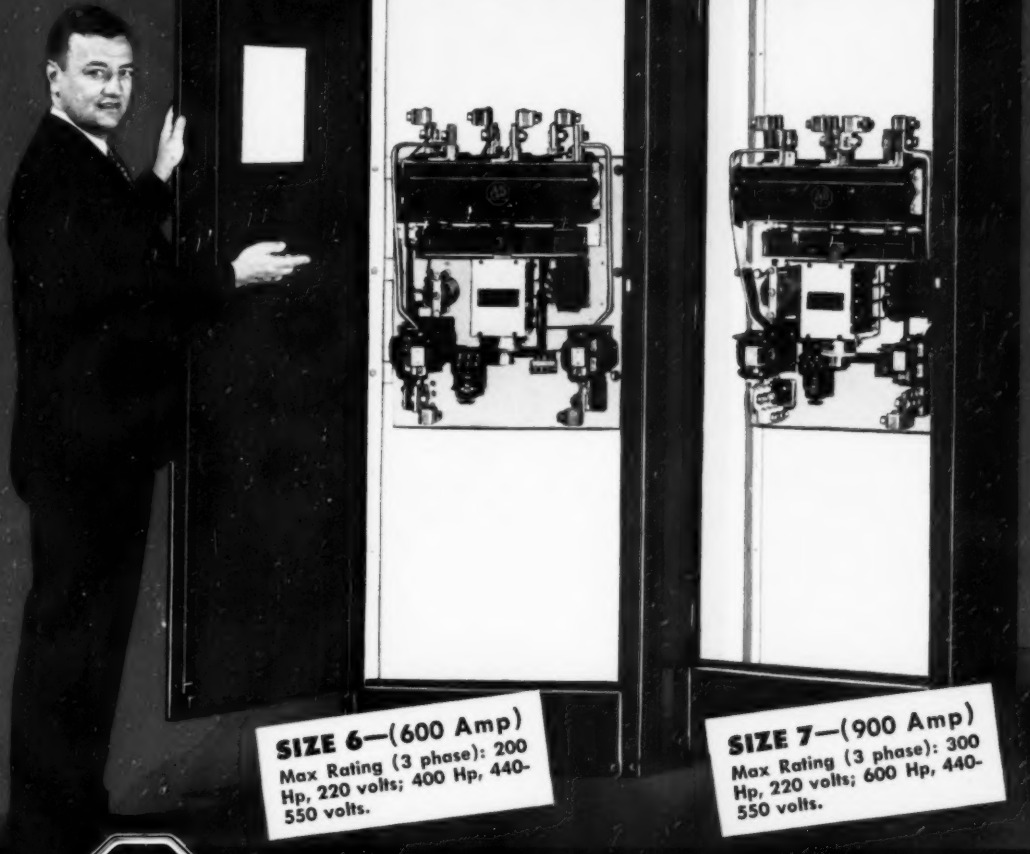


BARBER COLMAN

Announcing...

The *NEW* Size 6 and Size 7 SOLENOID Starters



SIZE 6—(600 Amp)
Max Rating (3 phase): 200 Hp, 220 volts; 400 Hp, 440-550 volts.

SIZE 7—(900 Amp)
Max Rating (3 phase): 300 Hp, 220 volts; 600 Hp, 440-550 volts.

A-B Quality

ALLEN-BRADLEY

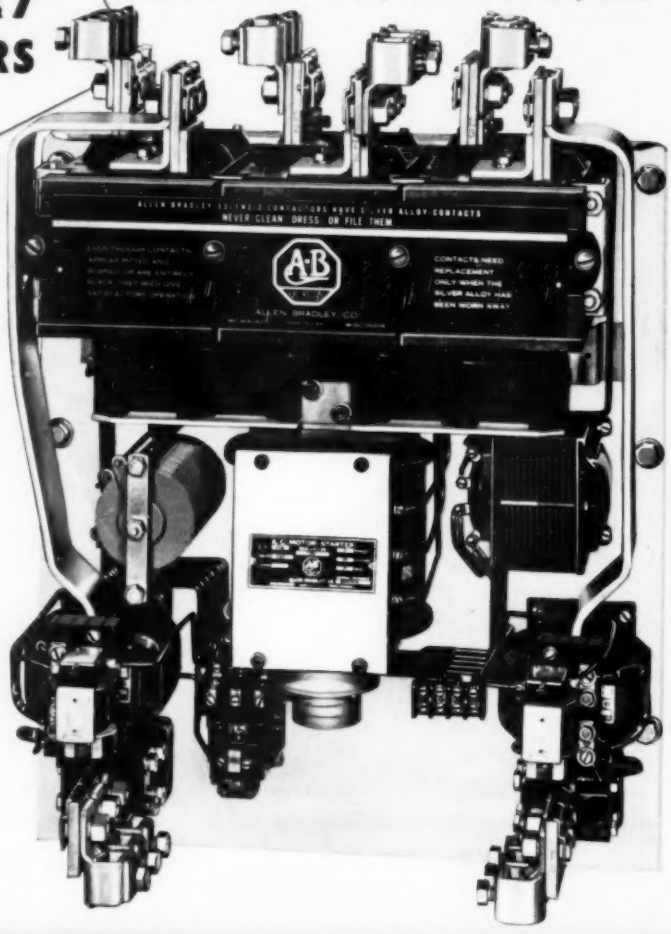
SOLENOID MOTOR CONTROL

SEE OTHER SIDE

Now- All the Advantages of SOLENOID design

in the NEW SIZES 6 & 7 STARTERS

In years of service, under all operating conditions, the Allen-Bradley solenoid construction has proved its superiority beyond all question of doubt. Now Allen-Bradley has developed Sizes 6 and 7 solenoid starters . . . with all the features that have proved so successful in smaller Allen-Bradley starters. Check its many features.


ALLEN-BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN, DRESS, OR FILE THEM
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY
A-B
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SILVER ALLOY CONTACTS

The double break, silver alloy contacts never require cleaning or filing—a distinct advantage over conventional copper-to-copper contacts.

SIMPLE, RUGGED CONSTRUCTION

These starters have no pins, pivots, hinges, or complicated mechanisms to cause trouble. The solenoid switch mechanism has only one moving part.

SMALLER SIZE

The open type Size 6 starter is less than ¼ as large as conventional starters, and the enclosed unit takes only 58% of the floor space. Size 7 is even smaller, compared with other starters.

STEEL PANEL MOUNTING

The switch is mounted on a metal base plate instead of a slate panel, and is self insulated. It can be quickly and easily mounted to metal surfaces without additional insulation.

FRONT-OF-PANEL WIRING

All terminals and wiring are readily accessible from the front. There is no back panel wiring.

AVAILABLE IN MANY FORMS

Size 6 and Size 7 solenoid switches can be furnished in 2 pole or 3 pole contactors, across the line starters, reversing switches, reduced voltage starters, and many other combinations where clapper type switches were previously used.

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Allen-Bradley Co., 1316 S. Second St.
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A-B Quality

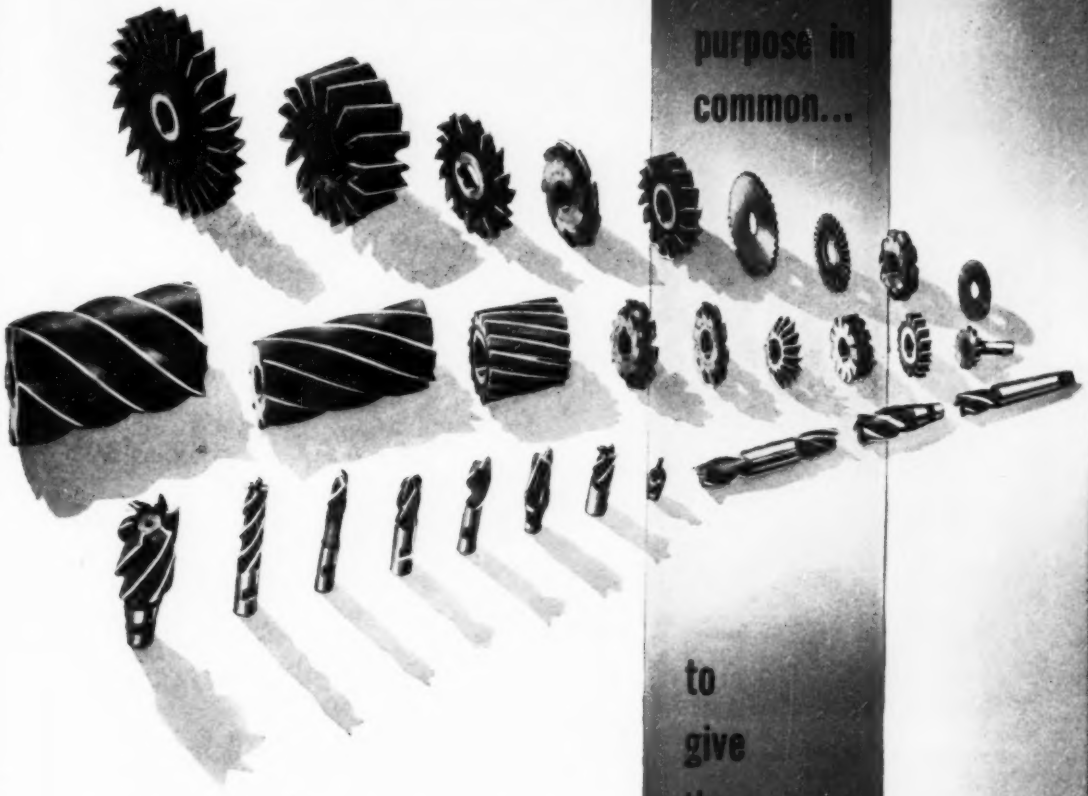
ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

many styles . . . many sizes

with one purpose in common . . .



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Check all the advantages of Brown & Sharpe Cutters. A broad range of cutter styles and sizes is available for efficient milling on a wide variety of work and materials. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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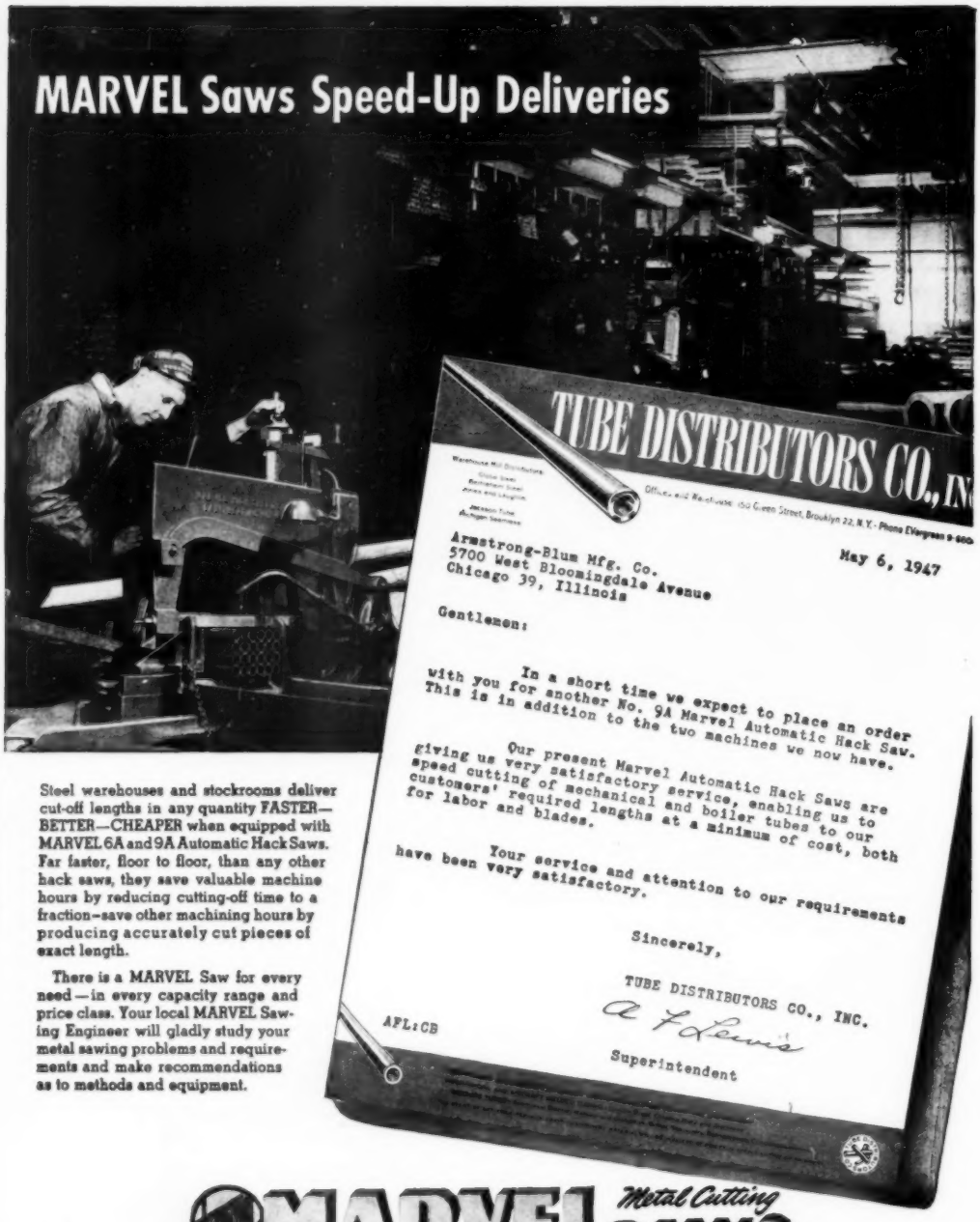
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Armstrong-Blum Mfg. Co.
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Gentlemen:
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Our present Marvel Automatic Hack Saws are giving us very satisfactory service, enabling us to speed cutting of mechanical and boiler tubes to our customers' required lengths at a minimum of cost, both for labor and blades.
Your service and attention to our requirements have been very satisfactory.
Sincerely,
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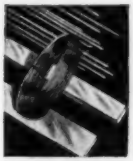

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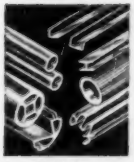
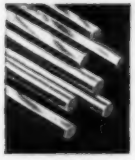
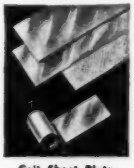


Extrusions Structurals



Screw Machine Stock



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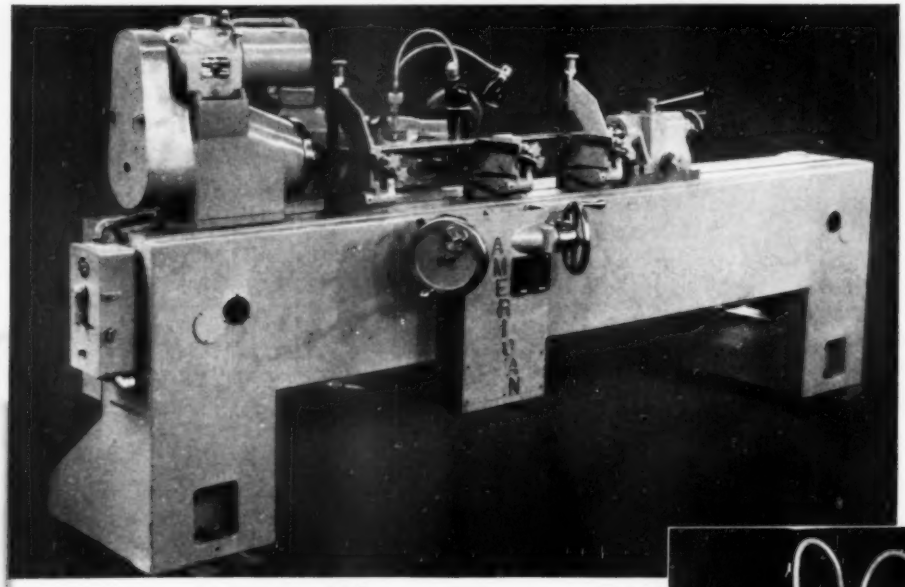


The NEW *American* ROUND BROACH SHARPENER *Can Give You These Advantages*

- **Time Saved Through Faster Resharpening**
- **Money Saved By Fewer Resharpenings**
- **Part Cost Lowered By Better Resharpening**

The new American Round Broach Sharpener is designed to make possible fast, highly accurate broach resharpening in your own plant. It is speedy, efficient, needs no highly skilled operator.

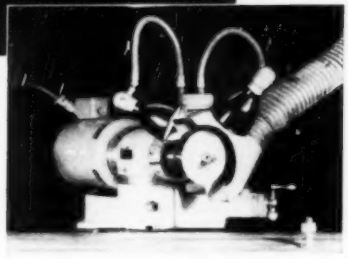
American designed the new RBS to overcome broach vibration which results in an inferior job. **The broach is rotated between fixed centers, while the carriage mounted grinding spindle is traversed from tooth to tooth.**

Here's what you get with this NEW idea:

1. The broach is supported above and between the pedestals. It never extends beyond the bed. This solid support minimizes vibration, improves resharpening. 2. Machine is more durable because there is less wear on vital ways with the ball-bearing mounted carriage always in full contact — never extended. 3. Resharpening is faster, and more accurate because efficient design relieves operator from mental and physical fatigue. 4. Minimum floor space required because no traveling members extend beyond the bed length.

The RBS has been thoroughly tested, for over a year in actual use, in the plant of one of the largest users of broaching in the country. It has proven highly successful. It saves time in broach sharpening, and gives a better sharpening job.

The American Round Broach Sharpener is now available in two models to sharpen cylindrical broaches up to either 60" or 84" in length and up to 9" in diameter.



Model RSB9-84. Insert shows grinding spindle.

FEATURES of the *American* Round Broach Sharpener

- Sturdy Construction
- Heavy Ribbed Cast Iron Bed and Pedestals
- Full Between Pedestal Support
- Simple Manual Control
- All Controls Mounted on Carriage
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- Micrometer Dial and Rapid Traverse Lockout on Left Handwheel
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- Graduated Face Plate
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Write for complete informative Circular No. 800. Please address Department A.

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A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
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COOLANT PRACTICE FOR MACHINING ALCOA ALUMINUM

No cutting fluid can make up for poor setup or dull tools, but you'll make your Alcoa Bar Stock go farther with good coolant procedures.

You can expect a good cutting fluid to: Remove heat from work and tools. Lubricate tools and usually the tool slides. Wash away chips from tools and work. That's all.

Alcoa's technical departments are anxious to help you with cutting fluid procedures and other machining problems. Why not get acquainted by asking for a free copy of "Alcoa Aluminum in Automatic Screw Machines"? Your nearby Alcoa sales office will supply you, or write ALUMINUM COMPANY OF AMERICA, 1709L Gulf Building, Pittsburgh 19, Pennsylvania.

Use a large volume of coolant. Keep the nozzles open. Thin, high-speed streams won't cool fast enough nor keep the chips away from the tool.

Direct the stream to hit the tool and work at the proper angle. Chips should be washed away to prevent fouling the tool.

Use a good cutting fluid. Special aluminum alloy coolants generally consist of light mineral oil with 5—10% fatty additions. Viscosity should be 45 to 65 seconds at 100 degrees F on a Saybolt Universal viscosimeter. Flash point should be above 270 degrees F.

GOOD MACHINING PRACTICES SAVE METAL

ALCOA ALUMINUM

4 Steps to Increased Tool Life

1. Design each tool carefully to perform its job, considering *fully* all known factors which influence tool life.

2. Select tool steel of the correct chemical analysis with the best combination of properties for each tool or die.

3. Follow heat-treatment recommendations exactly. Use lots of care in hardening and tempering. Avoid excessive decarburization.

4. Establish grinding techniques that produce the ideal surface finish for the intended service, free from grinding cracks.

If you have not been following these four steps religiously, do so and you'll increase tool life.

Bethlehem Steel Company, Publications Department
Bethlehem, Pa.

Please send me a copy of your new booklet describing:

- ☐ *Carbon and Carbon-Vanadium Tool Steels*
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It's not a simple formula. Tool design must take many factors into consideration. Grinding procedure, too, is a variable that is seldom easy to perfect.

But follow these four steps, and you're headed for better performance and longer life. And we can help you when it comes to selecting the right tool steel.

Heat-treatment technique is another vital step where one of our technical men can put his finger on the spot that may be causing trouble. All of our tool-steel contact metallurgists are experienced tool hardeners, and they've helped to solve a variety of problems involving tool design and grinding.

Whether it's technical assistance or fine tool steels you need, call on Bethlehem. In our mill depot we carry ample stocks of carbon, oil- and air-hardening grades . . . shock-resisting, hot-work and high-speed steels. Just call the nearest Bethlehem sales office or tool-steel distributor for complete information.

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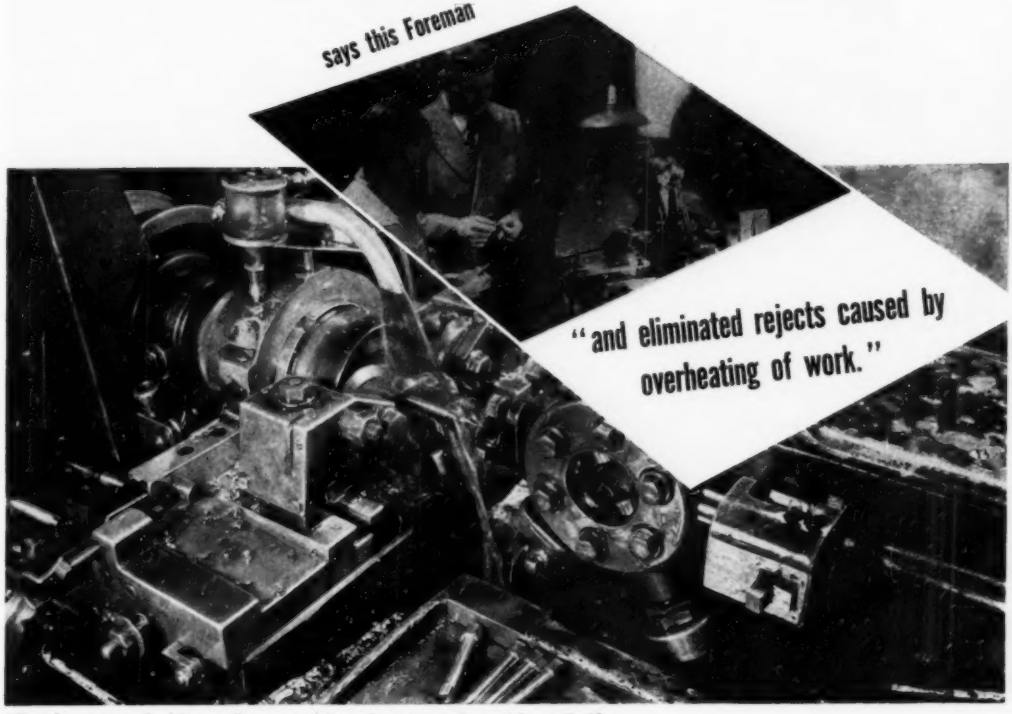
BETHLEHEM TOOL STEELS for EVERY JOB

"With GULF CUT-AID we increased drill life on brass bolts more than 100%"



The foreman of this modern machine shop consults with a Gulf Lubrication Engineer on results with Gulf Cut-Aid in machining small brass parts.

"We've found that Gulf Cut-Aid is the ideal cutting fluid for most nonferrous metals," says this Machine Shop Foreman. "With competitive oils, we had trouble getting penetration into the hole while drilling, and our tool life was unsatisfactory. Now with Gulf Cut-Aid we drill a thousand pieces before regrinds are necessary. Also, because of the exceptional cooling properties of Gulf Cut-Aid, we have no difficulty holding tolerances to specifications."

Here's why Gulf Cut-Aid is setting new performance records for machining operations on many types of nonferrous metals: (1) outstanding penetration and surface wetting properties, (2) high cooling ability—approaching that of soluble oil emulsions, (3) transparent, permits visual inspection of work.

It will pay you to investigate the advantages of this revolutionary cutting fluid for nonferrous metals in your shop. Write, wire, or phone your nearest Gulf Office today and ask the Gulf Lubrication Engineer to call.

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GULF INDUSTRIAL LUBRICATION

Another Lodge & Shipley *Profit Feature!*

● Practically eliminating the problem of bedway wear, Lodge & Shipley Model "X" Lathes are equipped with hardened and ground tool steel bedways (59-64 Rockwell C). Finish ground with great accuracy, *separately from the lathe*, these bedways are completely interchangeable. Their alignment with the lathe is assured and maintained by the tongue-and-groove construction.

The shape of the bedways is all important too, particularly the front or angular guideway, developed entirely by Lodge & Shipley and proved in more than 13 years of use. All guiding of the tool carriage is done by a combination of bearings on front, top and angular surfaces of the bedway.

With this construction, the carriage is guided at a point directly above the driving point. Whether drive is through the rack or the lead screw, there is no tendency for the carriage to "twist" or climb on the bedways, as is the case with conventional inverted Vee bedways. Any trend toward such twist or climb is rigidly resisted by the dovetail design of the carriage bearing against the angular surface of the bedway. Full length adjustable gibs provide adjustment for a positive, never-varying bearing on the bedway.

No Appreciable Wear in 50,000 hours of continuous use!

Think of it: No significant decrease in famous Lodge & Shipley accuracy . . . over the equivalent of more than 25 years of normal 8 hour per day use!

Easily Replaced if ways are damaged

You can't wear out Lodge & Shipley hardened ways, but if they're accidentally damaged, you can replace them, avoiding a several thousand dollar bill for lathe rebuilding!

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

Your LODGE & SHIPLEY *Engineer* will gladly give you a more detailed explanation *and* demonstration. Call him or write for detailed literature which shows outstanding Profit Features.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

MOTOR EXCHANGE SERVICE

For Westinghouse
single-phase and three-phase
1 to 20 hp
frame 203 to 326 a-c motors

Another Life-Line First!

The Broadest Exchange Plan!

Since February, 1949, Life-Line motors have offered you the broadest exchange plan in industry. All 1 to 20-hp, single-phase and three-phase a-c motors in frame 203 to 326 are included. No other manufacturer of motors—large or small—provides exchange service that compares in scope to this new Life-Line Motor Exchange Service.

120 Westinghouse exchange points assure you rush motor replacement service anywhere in the United States. Replacement motors, covered by this plan, are in stock, ready to be speeded to you at any time.

And what's more, if a motor fails during warranty period, it may be exchanged *free* for a motor of identical rating. The *exchange price,* beyond warranty, *is not dependent on the time in service . . . one year, five years or ten years.*

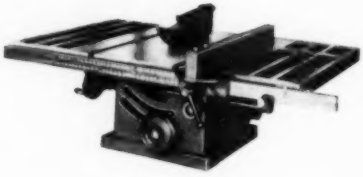
This service is one more advantage you get with Life-Line motors. Add this to all-steel construction . . . pre-lubricated bearings . . . an indicated savings of $750 per year per 100 motors . . . and you'll see why Life-Line has gained leading acceptance in the motor industry.

Complete details on the Life-Line Exchange Service—lists of exchange points and motor ratings covered—are given in the new booklet SM-5243. Get your copy today from your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21533

Westinghouse *Life-Line* Motors

WALKER-TURNER

Spindle Shaper

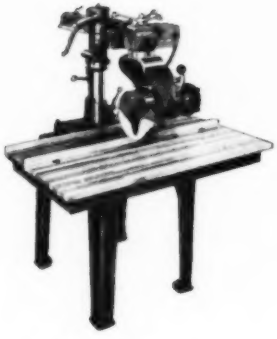


9" Tilting
Arbor Saw

12" Band Saw

14" 16" Band
Saws

15" 20" Drill
Presses



Radial Saw
1½ to 5H.P

NEW CATALOG

The first of several new catalogs in process is now ready for distribution; write now for your free copy . . . All the latest models are fully described, the complete Walker-Turner line is illustrated. A post card will bring your copy by return mail, or ask your dealer for a copy.

MACHINE TOOLS

HELP YOU BEAR DOWN ON PRODUCTION COSTS WHEN DOLLARS ..... AND EVEN PENNIES *Count*

6" Jointer

10" Tilting
Arbor Saw

Almost anyone can be a successful manufacturer in a seller's market—with no worries about production costs, and no competition.

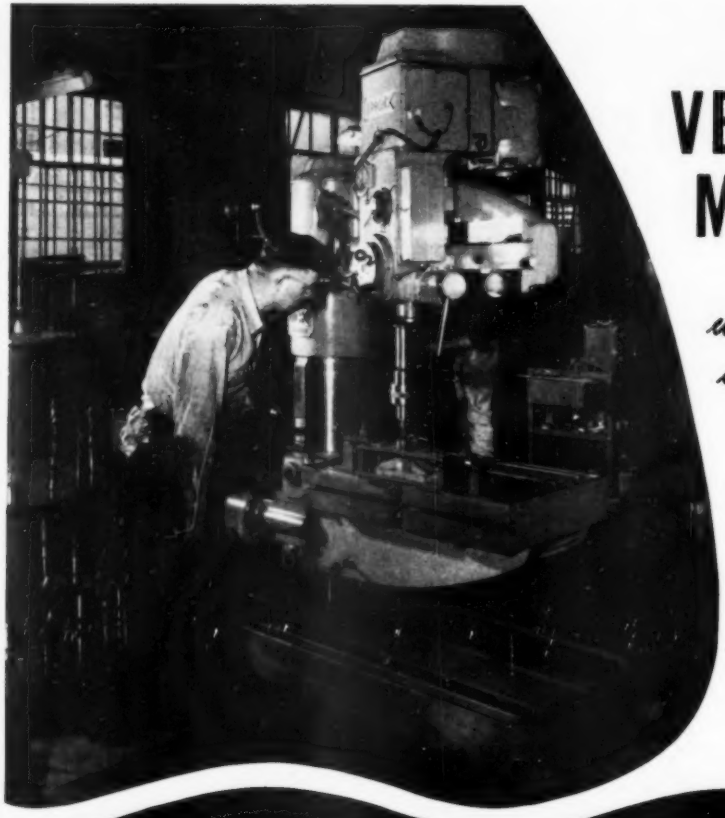
But when dollars, and even pennies count—when competitive prices must be met—then success can come only through economy in production.

Walker-Turner light machine tools can help you bear down on production costs—help bring you in "line," because they are designed for volume production of high quality, and are sold at popular prices.

AUTHORIZED DEALERS ONLY

Walker-Turner does not sell its products direct to users. Its machine tools, motors, accessories and repair parts are sold only by authorized Industrial Machinery Distributors who have been selected because of their Engineering and Service facilities.

BAND SAWS • DRILL PRESSES • TILTING ARBOR SAWS
JIG SAWS • RADIAL SAWS • TABLE SAWS • JOINTERS • LATHES • BELT AND DISC SURFACERS
walker-Turner
DIVISION
KEARNEY & TRECKER CORP.
PLAINFIELD, N. J.
U. S. A.



A VERSATILE MACHINE

for a wide variety of sensitive work

FOSDICK SENSITIVE RADIAL

● This FOSDICK Sensitive RADIAL has received phenomenal acceptance in tool rooms, small and large plants—wherever there is a need for high speed sensitive drilling.

It differs from the conventional radial in that it has an arm at fixed height from the base. It also features an adjustable table mounted on the column. Both arm and table swing in an arc of 360°. Also the Fosdick one-piece column construction is stronger, provides greater rigidity than the usual two-piece design.

The adjustable table assures correct positioning of table for every job. Nine spindle speeds and four speeds are available.

Other new features include a new semi automatic tapping control—tool ejector—fluorescent tube lighting the entire table in any position.

Here's a modern machine tool designed for sensitive drilling, reaming, facing and tapping operations plus the flexibility of radial design and construction.

For further details write for the Fosdick Sensitive Radial Bulletin S.R.A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

ELECTRONIC MEASURING EQUIPMENT

This equipment provides a reliable means for taking external and internal measurements with precision and ease that advance accurate manufacture and size control. By a simple turn of graduation selector, tolerances can be checked from "tenths" to "hundredths".

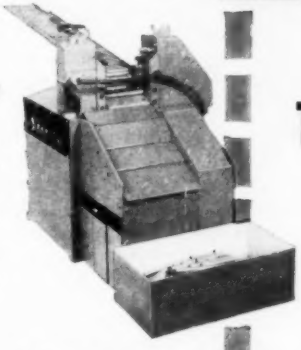
Exclusive advantages: any graduation value between .0001" and .00001" . . . separate amplifier completely isolates heat-producing elements . . . true linear response of amplifier permits accurate setting for entire scale with only 1 gage block . . . amplifier may serve several separate testing instruments.

External comparator with range of 0-4". Simplified setting. One master only. Reversible anvil. Self-checking. Shock-protected. Diamond gaging point.

Internal comparator attachment for use with external comparator and amplifier . . . range ½" to 2". Frictionless. No parts to wear. Only one master.

Gage head cartridge for mounting in jigs, fixtures or similar testing pieces. Measurement range .002". Frictionless. Dust and moisture proof.

ELECTRONIC INSPECTION AND SORTING EQUIPMENT



Unique design . . . manual loading and disposal to fully automatic . . . custom-engineered at Brown & Sharpe to meet individual requirements. Simplification of parts and functions makes machines more compact, more dependable.

Take your cost cutting cue from this *QUALITY CONTROL EQUIPMENT*

With any one of these modern quality control devices, you can lay the foundation for an efficient, cost-cutting quality control program. Each device offers thoroughly-proven features that broaden the advantages of quality control. All reflect the high precision standards associated with the Brown & Sharpe name. For complete details, write Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

JOHANSSON GAGE BLOCKS

. . . world famous both for their extreme accuracy and for their fast-growing importance to manufacturing of interchangeable parts. These precision aids to quality control are made by Brown & Sharpe; from single blocks to complete sets and useful accessories. Jo-Blocks have hundreds of cost-saving uses.

We urge buying through the Distributor

BROWN & SHARPE

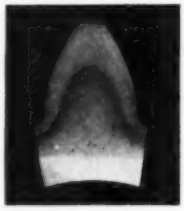
YOU CAN BE **SURE**.. IF IT'S

Westinghouse

TAPER-HARDENED

Hard and Tough

this "taper-hardened" tooth bends before it breaks



Taper-Hardened Tooth Section

Case-Hardened Tooth Section

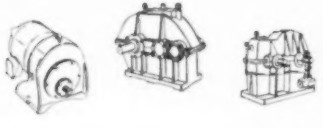
The taper-hardened tooth above bent under the same force that snapped the case-hardened tooth. Yet a test will show wearing surfaces of nearly equal hardness.

The cross sections at the left show why taper-hardened gears have resilience and life under their hard surfaces—why they last longer in punishing service—why they "roll with the punch". Notice the graduated hardness in the taper-hardened tooth—blending down the scale from maximum hardness at the surface to toughness at the ductile core. Compare it with the thin, brittle, shell-like hardness of the case-hardened tooth in which there is no give, no bend.

No wonder "taper-hardened" BP gear steel makes gears last so long.

For complete information on taper-hardening, write for free copy of "BP Gear Steel" B-4395, Westinghouse Electric Corp., Dept. 111, P. O. Box 868, Pittsburgh, Pa.

J-07276



Westinghouse

GEARED DRIVES

Can you take advantage of this REAL ECONOMY?

THIS 2" TURRET LATHE

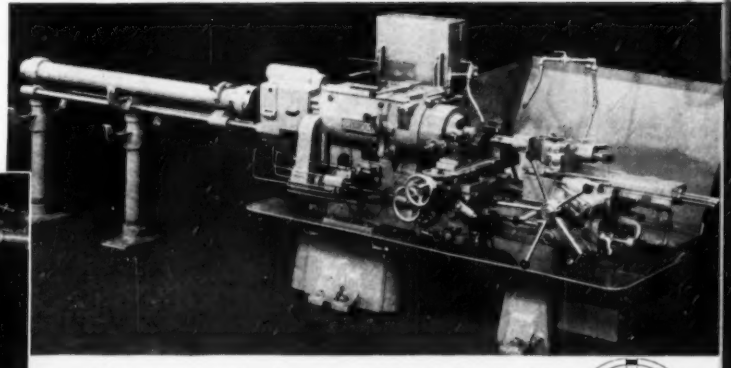
WAS 4½" COLLET CAPACITY for tubing, plastics and lightweight bar stock

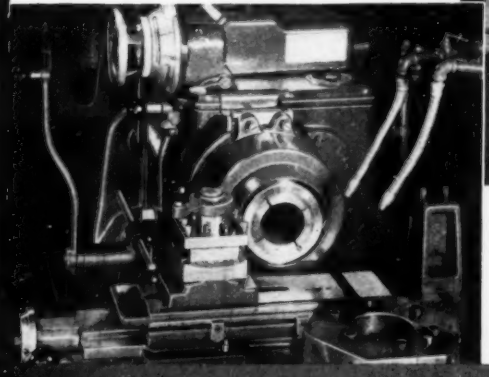
GISHOLT No. 4 UNIVERSAL RAM TYPE TURRET LATHE

You don't have to invest in expensive heavy-duty lathes to handle large diameter work of this nature. Here is the ideal lathe to machine tubing, plastics, or lightweight bar stock such as aluminum. You can use it for softer metals like brass, too.

The Gisholt No. 4 Ram-Type Turret Lathe (normally 2" bar capacity) can be furnished with a larger spindle bore providing 4½" round collet capacity. This machine gives you all the modern operating advantages which mean high speed production and low costs. It may be the economical solution to your problem. Ask your nearest Gisholt representative about it. Or write us for complete information.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin





The Gisholt No. 4 Ram-Type Turret Lathe with 4½" round collet capacity and equipped with 4½" bar feed. (At left) Close-up view of 4½" capacity collet chuck. This machine is ideal for large diameter tubing.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

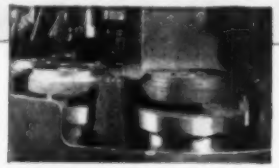
A RUGGED MACHINE FOR

THOSE RUGGED JOBS — *But Fast*

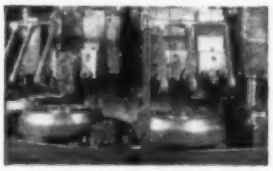
BULLARD

TYPE "D" 16-23

MULT-AU-MATIC

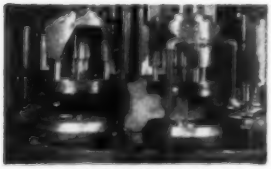


Sta. 1 — Load. Sta. 2 — Rough bore hole, rough turn and sweep chamfer.

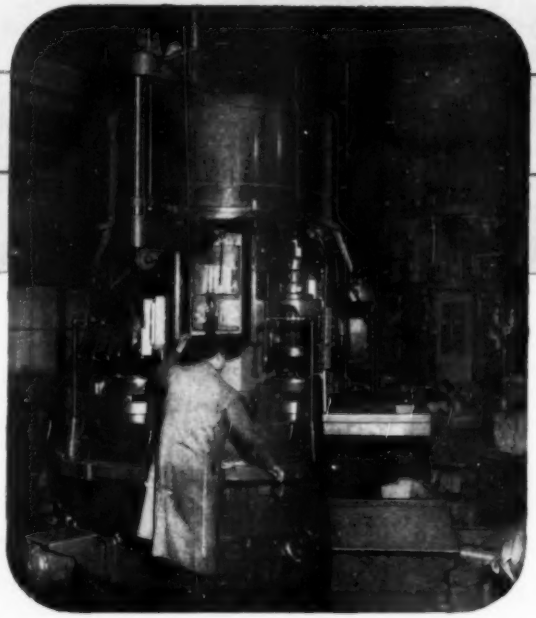


Sta. 3 & 4 — Three, rough face and four, second face.

Sta. 5 & 6. Five, finish face and six, true bore, ream, ct' bore, turn and chamfer.



Sta. 7 & 8. Multiple drilling.



Machining Flywheels to close accuracy at a Profit-Making Pace. Rugged work — BUT FAST.

BULLARD

Mult-Au-Matic's rugged construction assures rigidity under heavy cutting. Repetitive accuracy throughout long runs minimizes spoilage and inspection costs.

Mult-Au-Matic design provides for a wide variety of tooling to meet the requirements of a wide variety of work design.

Ask for a Bullard Cost Saving survey of your jobs when applied to the Mult-Au-Matic. Write today.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

THE GREENFIELD STORY

of Service and Quality

"Gun"

CHIPS clogging in the flutes of taps are the No. 1 cause of breakage. This happens particularly when the metal is "stringy" and the tap is being used in a machine operating at high speeds.

"Greenfield" engineers licked that problem years ago in through hole tapping by inventing a tap that shot the chips out ahead as it cut a thread. *They named it the "Gun" Tap.* The advantages are many. The body of the tap can be thicker and stronger. The shearing action of the tap takes less power. And the threads are more accurate.

Perhaps you have been using "Gun" Taps for years and this is an old story to you. If not, you may be interested in learning more about "Gun" Taps from your local "Greenfield" Distributor or by writing direct to "Greenfield".

GTD

GREENFIELD TAP and DIE CORPORATION
Greenfield, Massachusetts

and

GTD MET DIE

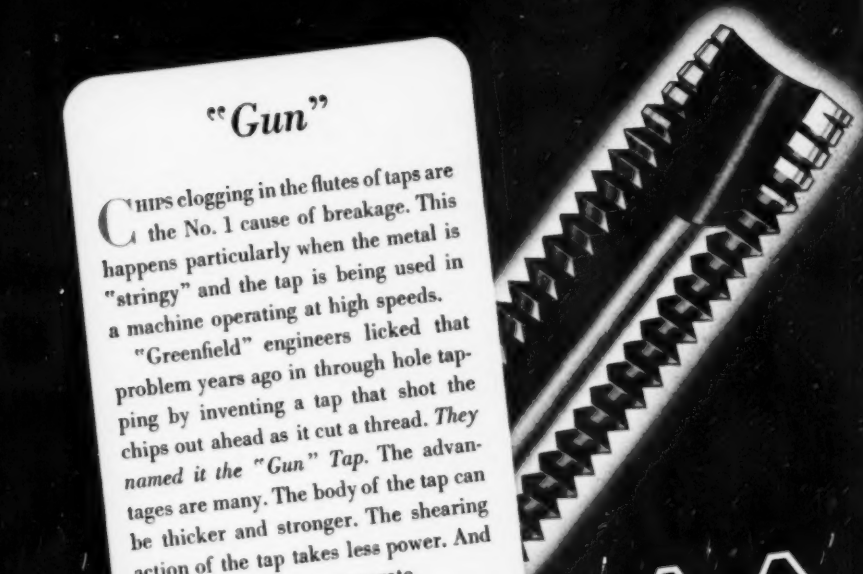
THE GEOMETRIC TOOL CO.
New Haven 15, Connecticut

and

GTD AMPCO

AMPCO TWIST DRILL CORP. ★
Jackson, Michigan

Divisions of Greenfield Tap and Die Corporation



GTD

GREENFIELD

Be Sure
Buy "Greenfield"

* Since July 1 the operations of Ampco Twist Drill Corporation have been merged with Greenfield Tap and Die Corporation of Greenfield, Mass.

Precision THREADING TOOLS

Solid Adjustable

Class SJ Tap and Chasers

Where the time for backing out is unimportant, or where space is limited the SJ Tap is recommended.

* *

Available in eleven sizes with a cutting range from $1\frac{5}{16}$" to $8\frac{1}{2}$".

* *

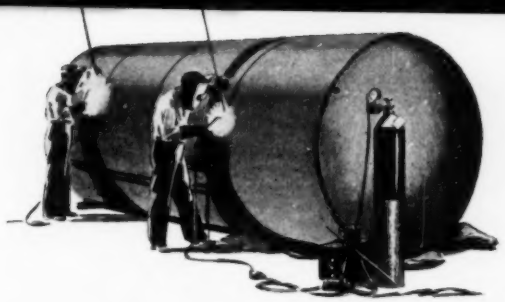
GEOMETRIC also makes a complete line of Rotary and Stationary Self Opening . . . and Solid Adjustable Die Heads—and Collapsing Taps—and GEOMETRIC Chasers.

"Be Sure . . . Buy Geometric"

THE
GEOMETRIC
TOOL COMPANY, NEW HAVEN 15, CONNECTICUT

GTD

GTD AMPCO



LIQUID OXYGEN + FINE CARBON = BOOM

In some coal mines, a mixture of liquid oxygen and finely divided carbon is used for blasting. This 4,000-gallon liquid oxygen storage tank was fabricated by L'Air Liquide Society, Montreal, Canada. Made of Everdur† for strength and corrosion resistance, 150 feet of seams were arc-welded by the inert-atmosphere process using water-cooled torches.

TUMBLING FOR 10 YEARS

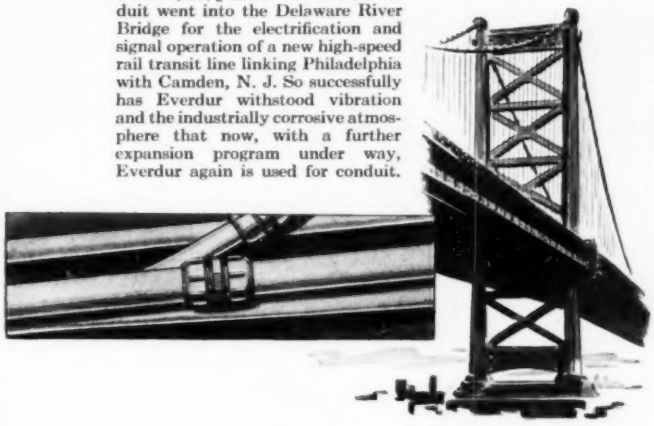
This isn't an act, it's a record—up to now—for this battery of three tumbling barrels made of Everdur. Used for wet tumbling, polishing and lustering of light metal products in corrosive solutions, they outlast wooden barrels by 20 to 1.

EVERDUR* goes everywhere...

†REG. U. S. PAT. OFF.

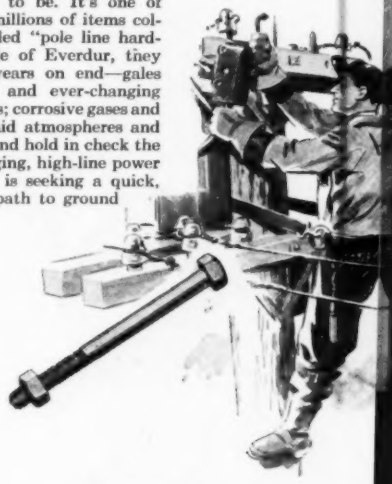
14½ MILES—14½ YEARS

In 1935, 14½ miles of Everdur Conduit went into the Delaware River Bridge for the electrification and signal operation of a new high-speed rail transit line linking Philadelphia with Camden, N. J. So successfully has Everdur withstood vibration and the industrially corrosive atmosphere that now, with a further expansion program under way, Everdur again is used for conduit.

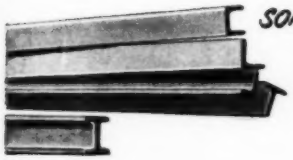


ONE IN A MILLION

This isn't an ordinary bolt—it can't afford to be. It's one of uncounted millions of items collectively called "pole line hardware." Made of Everdur, they resist—for years on end—gales and storms and ever-changing temperatures; corrosive gases and vapors; humid atmospheres and saline fogs, and hold in check the anxious, surging, high-line power that forever is seeking a quick, destructive path to ground



SOMETHING NEW HAS BEEN ADDED



This is just to let you know that Everdur structural shapes are now available from stock in angles, channels, Tee shapes and "I" beam sections. Address The American Brass Company, 70 Sayre Street, Buffalo 5, New York.

P.S. HOW ABOUT SENDING IN YOUR STORY ON EVERDUR?

WANT TO KNOW MORE?

Our Technical Department has a wealth of information on the properties and applications of Everdur. Write to The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

49191

Where corrosion resistance counts

ANACONDA

COPPER-SILICON ALLOYS*

ARMSTRONG

Quality TOOLS

NOT A COST, BUT AN INVESTMENT

That Pays Year After Year...

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's job and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter-bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds, and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

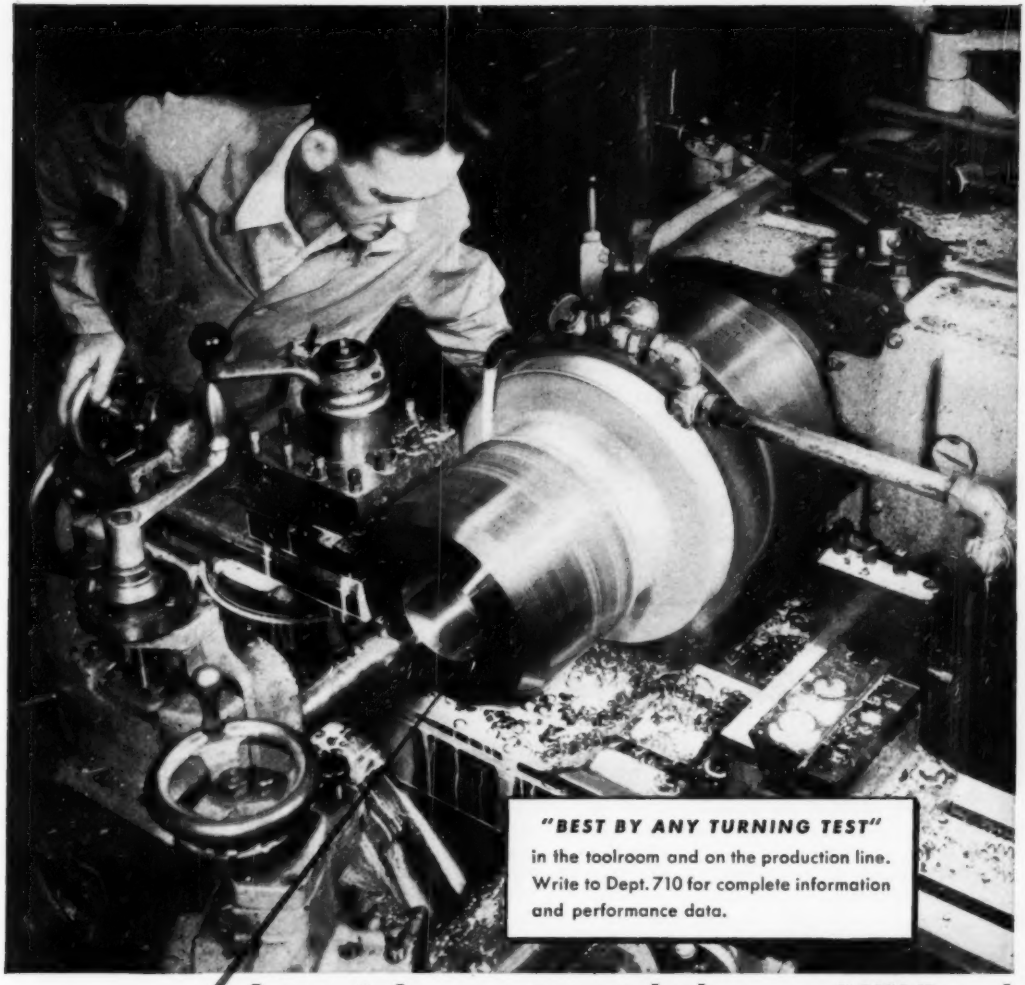
ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

Jones & Lamson turret lathes are BUILT and

POWERED TO PRODUCE

MORE CHIPS **per tool**
MORE PIECES **per hour**
MORE PROFIT **per job . . . than any turret lathe of comparable size!**

Turret Lathe Division **JONES & LAMSON**
MACHINE COMPANY
Springfield, Vermont, U.S.A.
MACHINE TOOL CRAFTSMEN SINCE 1835

A SAVING OF $8.00 PER PIECE

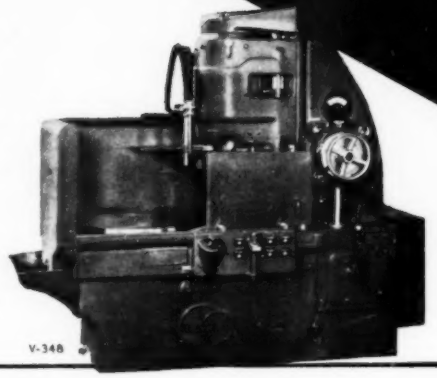
WHEN THEY.... PUT IT ON THE BLANCHARD

Yes, this special alloy stainless steel ring 28" x 2½" x 9/16" was finish ground on the No. 18 Blanchard Surface Grinder with 36" chuck at a saving of $8.00 per piece over previous method.

Machining this alloy stainless steel ring by the previous difficult method cost $9.00 per piece. The combination of Blanchard Grinder, Blanchard Engineering, and wheel selection reduced production cost to $1.00 per ring. One side was ground removing .070" of metal to close dimension and flatness tolerances.

Here again is proof positive that the most profitable words in flat surface machining are "Put it on the Blanchard."

Are you machining your flat surface the most economical way? Talk it over with Blanchard.



Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Send for your free copy of the first edition of "Art of Blanchard Surface Grinding." This newest of Blanchard books shows you how to get best production results with Blanchard Surface Grinders.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

"Have you learned this fact?"

"Throw away the book!"
Here are the new Shell soluble oils that can COMPLETELY CHANGE your cutting fluid practice
SHELL METAL WORKING OILS

It may help you slash cutting fluid costs 75 to 90%!

You have experienced the economy of soluble oils on light machining and drilling jobs . . . Haven't you often wished that this same economy could be extended to your tougher jobs, which have always required expensive conventional cutting oils?

Shell has developed *soluble* oils that replace conventional cutting oils on many heavy duty jobs *with emulsions as high as 10 to 1.*

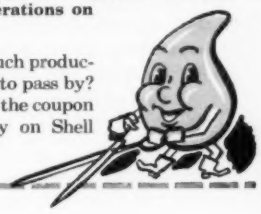
These actual cases prove it:

1. No. 52100 steel, turned, drilled, and milled for ball bearing assemblies . . . formerly required high-cost cutting oil. Now machined just as well using a Shell heavy duty soluble oil mixed with 10 parts of water.

2. In a very heavy turret lathe, turning rock drill bits, the cutting speed was actually increased when a Shell heavy duty soluble oil, diluted 4 to 1, replaced an oil-type cutting fluid.

3. Replacing an expensive, highly compounded cutting oil, an emulsion of one part of a Shell heavy duty soluble oil and 10 parts of water proved highly satisfactory in milling and profiling operations on gun receivers.

Don't you agree that such production savings are too vital to pass by? We suggest that you mail the coupon now for the whole story on Shell heavy duty soluble oils.



SHELL®

Shell Oil Company
54 West 50th Street, New York 20, N. Y., or
100 Bush Street, San Francisco 6, California

Gentlemen: Please furnish available information on the new heavy duty soluble oils

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SHELL METAL WORKING OILS

A completely rebuilt motor is tested with dynamometer. This machine applies low voltage and overloads exactly as in actual usage.

Complete Facilities

KEEP ELECTRIC MOTORS ON THE JOB

California Electric Works, San Diego, features modern equipment, large stock of parts, 2 shift operation, 24 hour service in emergencies to give top-flight Allis-Chalmers Certified Service

IN SAN DIEGO, and *every* major industrial center in the United States you will find an outstanding, independent Allis-Chalmers Certified Service shop.

These shops have been carefully picked for their experience, highly skilled workmen, modern equipment and business reputation. Each uses nothing but factory approved methods and parts.

So when you need service on electrical equipment, call the nearest Allis-Chalmers Certified Service shop. You can be sure of fine workmanship, fast service and fair prices.

GOOD SOURCE FOR NEW MOTORS, TOO

Your Allis-Chalmers Certified Service Shop or Authorized Dealer can give you the same fast, dependable delivery on new motors. Whichever you need, new motors or service on your present equipment, you can depend on your Allis-Chalmers Certified Service shop.

A-2883

ALLIS-CHALMERS, 999A SO. 70 ST.
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by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

LOW COST — HIGH PRODUCTION

HARTFORD *Special*

Automatic Thread Roller

This Automatic Thread Roller is designed to solve standard and special thread rolling problems on small size screws from .086" to .190" in diameter with thread length capacity from ⅛" to 1½", rolling consistently to Class 3 Thread Fit. Careful engineering and rugged construction make it capable of continued high production runs with startling economy.

The "Hartford Special" Automatic Thread Roller incorporates such outstanding features as Completely Automatic Feed, Filtered Lubrication System "Table Top" Working Level, Vibration-Free Operation, plus many more.

Our engineering staff is always available to help you work out your thread rolling problems. Write now for complete information.

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Automatic Drilling and Tapping Machinery • Swaging Machines
Die Polishing Machines • Contract Machine Work • Gears • Cams
"Super-Spacers" • "Four-Point" Milling Vises • "V-Block" Milling Fixtures

THE HARTFORD SPECIAL MACHINERY CO.
287 Homestead Ave., Hartford 5, Conn.

Please send me free Bulletin TR-100 describing your Automatic Thread Roller.

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Quick, Economical

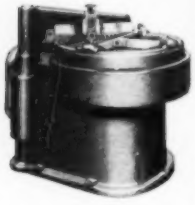
FLAT SURFACING

– Without Fixtures –

with

GARDNER

Horizontal Grinders



FOR over a third of a century, horizontal Disc Grinding has been the accepted method of quickly producing smooth, flat surfaces on a wide variety of parts, large and small.

Three advantages of GARDNER Horizontal Disc Grinding, that are piling up profits in many plants, are:

1. High-production, due to quick, free-hand operation without need of fixtures.
2. Simplicity of operation, enabling the use of unskilled workers with resulting low labor cost.
3. Almost unlimited capacity— a 53" machine, for example, can handle parts 2" square, and parts 30" long.

You also get the most modern design and construction in GARDNER Horizontal Grinders. Five sizes—18", 30", 36", 53" and 72" units are available; most of them with V-belt drive. Each carries new style louver-type guard ring and swinging bar-type dresser.

"Buy your Disc Grinding Abrasives from a Disc Grinder Builder"

FIG. 1.- A Gardner No. 188-36" machine grinds chilled steel wedges for freight car snubbers, to a 75% clean-up, at 15 to 20 pieces per hour.

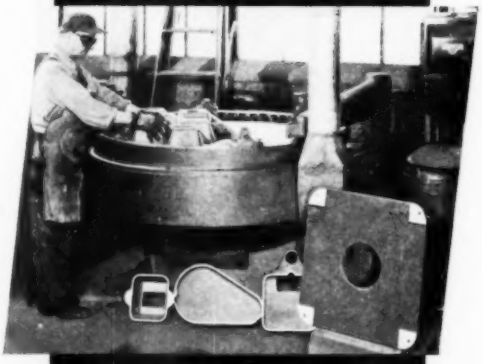


FIG. 2. Various parts for a well-known lathe, ground on a Gardner No. 124-53" machine at rates ranging from 12 to 30 pieces per hour.

GARDNER - GRIND YOUR *Flat* SURFACES

Write for New 24-Page Gardner Abrasive Booklet!

GARDNER MACHINE COMPANY

410 East Gardner Street • • • • Beloit, Wisconsin, U.S.A.

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LIKE THIS ACCOMPANIES EVERY

ILLINOIS TOOL HOB!

In leading observatories everywhere, the time-keeping accuracy of delicate chronometers is confirmed by the chronograph record ... equally reliable, the Toolgraph Chart that accompanies every Illinois Tool Works Hob is proof of tool accuracy.

A Certificate of Accuracy from Illinois Tool Works

You can actually see the accuracy of your hobs when they come from Illinois Tool Works ... and be certain of dependable performance. Costly rechecking of hobs is eliminated by the Toolgraph Chart, an automatic inspection record produced by specially designed electronic checking equipment.

This service is another Illinois Tool Works "first" ... typical of more than 36 years of leadership in the production of standard and special metal cutting tools of all types. For hobs, broaches, gear shaper cutters, milling cutters and special form tools engineered for maximum efficiency in your application, call on Illinois Tool Works.

ILLINOIS TOOL WORKS

"HEADQUARTERS FOR ENGINEERED CUTTING TOOLS"

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SEND FOR THIS FREE BOOKLET ...

Write today for a free copy of the Toolgraph Chart booklet for the full story of how the Illinois Tool Works Toolgraph Chart can help you increase gear production efficiency.

ILLINOIS TOOL WORKS • INCORPORATED 1901

NOW! . . . IN MEDIUM PRICED LATHES Extra-Long Bed Lengths

Sebastian GEARED HEAD 20" LATHES

20" x 20' LATHE
200" BETWEEN CENTERS
20¼" SWING

20" SEBASTIAN LATHE
Standard & Gap Types

AVAILABLE BED LENGTH	DISTANCE BETWEEN CENTERS
6'	32"
8'	56"
10'	80"
12'	104"
14'	128"
16'	152"
18'	176"
20'	200"

HANDLE LONG, SLENDER WORK PIECES

Have Same Capacity as Heavy Duty Lathes

Cut both initial and maintenance costs with this "KING Engineered" medium priced Sebastian Lathe. Handles a full range of work, including long, lightweight pieces ordinarily machined on expensive heavy duty lathes.

Outstanding features include all-geared, 8-speed headstock with Timken Bearings . . . reverse in apron for feeds . . . motor fitted in cabinet leg.

SEND FOR THESE FREE CATALOGS!

Illustrated Sebastian Catalogs S-1 (Standard Lathes) and S-101 (Special Lathes—Gap, Clutch & Brake, etc.) give complete description and detailed specifications. See for yourself why the modern Sebastian is today's outstanding value!

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KING MACHINE TOOL DIVISION

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Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

no other end mill will outperform a UNION

contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under the heading "Drills, Twist".

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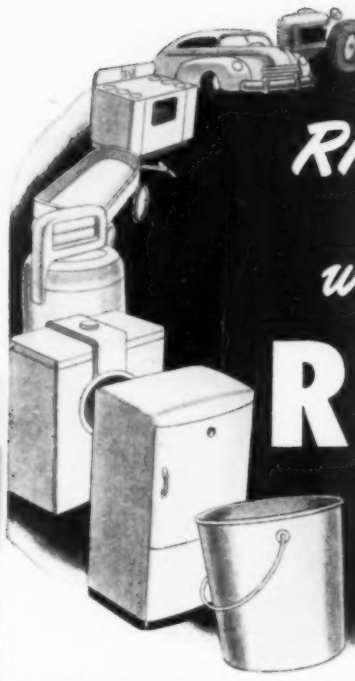
TOP SPEED RIVET SETTING with T-J RIVITORS



★ AUTOMATICALLY FEEDS AND SETS SOLID RIVETS!

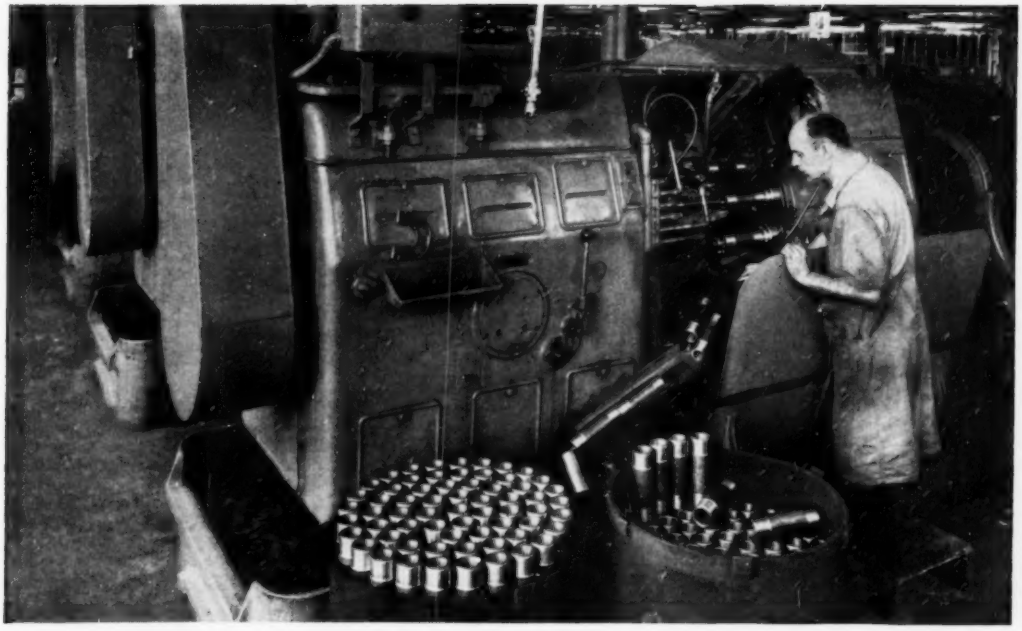
★ SAVES LABOR..CUTS COSTS!

On countless assembly jobs today —T-J RIVITORS are doing the rivet setting *faster and better!* T-J feeds and sets solid rivets *automatically* . . . no manual rivet handling . . . easy for women operators. T-J produces a solid rivet joint of 10% to 15% greater strength—a completely filled hole . . . no flashing . . . a neat, balanced head. Handles many types of rivets, including counter sunk head, flat head, round head, full and semi brazier head. Sturdily built . . . trouble-free operation . . . T-J dependability. Write for bulletin. The Tomkins-Johnson Company, Jackson, Michigan.

AIR POWERED
for aluminum alloy rivets up to 1/4" diameter or steel rivets up to 1/8" diameter, up to 3/4" long.
ELECTRICALLY POWERED
for 1/16" to 1/8" diameter solid steel rivets up to 3/4" long.

32 YEARS EXPERIENCE

T-J TOMKINS-JOHNSON RIVITORS



MAINTENANCE COST FOR THESE 4 MACHINES:
LESS THAN 2 7/10¢ PER HOUR
FOR 25,913 HOURS' CONTINUOUS PRODUCTION!

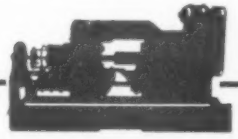
Here's a battery of four machines that has been continuously operating for 25,913 hours, producing a total of 1,215,853 pieces —and at an over-all maintenance cost of only $683.40. That figure covers both labor and materials.

In other words, maintenance averaged only $170.85 per machine! And bear in mind, this remarkable record was made on heavy duty work—the kind that puts a machine to severe test for stamina and sustained accuracy.

Acme-Gridley Automatics are built with basic design advantages for such low-cost performance: The rigid, box-type frame resists vibration, *holds* precision on heavy cuts. Positive, direct, quick-change camming eliminates the need for adjustments to take up wear in loose-connected linkages. It will pay you to investigate Acme-Gridley Automatics when you want the most in metal turning—more good pieces in the pan—with minimum maintenance. May we give you more information?

JOB FACTS

Part: Track Link Bushing.
Size: 2⅝" Diam. x 8" long; 7½ lbs.
Material: Steel Tubing.
Machine: Acme-Gridley 2⅝" RB-8 Spindle Automatic Bar Machine.
Performance: Battery of 4 machines operating continuously for 25,913 hours.
Production: 1,215,853 pieces.
Maintenance Charges: $683.40 total (including labor and materials).



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

THE NATIONAL ACME COMPANY

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YOU GET CORROSION RESISTANCE

Plus ECONOMICAL TROUBLE-FREE FORGINGS

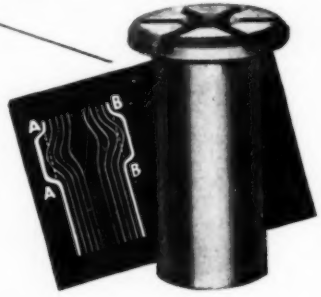
WITH *Carpenter* STAINLESS

POSITIVE PROTECTION against corrosion to withstand the effects of repeated sterilization, plus the required strength and hardness, made Stainless a natural choice for this forged dental instrument. Clean, flawless Stainless forging bars reduced rejects, increased output.

If rejects run high when forging Stainless, it's time to check all along the line. Many factors must be controlled right in the forge shop. But to eliminate trouble and secure best results you must be sure that your forging bars are sound, clean and free from injurious surface defects. Such forging bars assure easiest forging operations and lowest production costs.

At Carpenter, Stainless Steels are made in a tool steel mill to tool steel quality standards. Stainless billets are disc-inspected to assure soundness and homogeneity—and are then *machine-turned* to remove all surface imperfections. By this painstaking process we end up with Stainless bars that, lot after lot, assure economical, trouble-free forgings.

You'll find your nearby Carpenter representative extremely helpful when it comes to finding ways and means of applying Stainless to your products. Back of him stands a company with years of practical experience in solving Stainless problems. Call him in today or write us at the mill . . . And for your copy of our 134-page book "Working Data for Carpenter Stainless Steels" drop us a note on your company letterhead, indicating your title.



LONGER LIFE. In spite of tremendous pressures and highly abrasive conditions in service—forged knuckle pins like this stay on the job longer because they are made from Carpenter Stainless. And note in the diagram that forging produced an even grain flow throughout, thus strengthening the thin sections at points AA and BB.

more than corrosion resistance

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Export Department: 233 Broadway, New York 7, N.Y. "CARSTEELCO"

Carpenter

FORGING QUALITY

STAINLESS STEELS

WHEN YOU HAVE A STAINLESS PROBLEM—YOU CAN COUNT ON CARPENTER FOR THE ANSWER

Production UP...Costs DOWN with Special Tooling by POTTER & JOHNSTON

Three **SEPARATE PRECISION JOBS**

One **P&J — ENGINEERED SET OF SPECIAL TOOLS**

One **P&J AUTOMATIC**

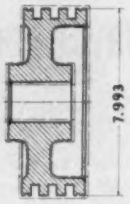
Experience does it every time. With it, you get the best in production-tooling, the best in precision, finish, speed, economy. Cases in point are these three dissimilar jobs, varying widely in size and specifications:

1. A semi-steel Retainer casting
2. A steel forged Sheave
3. A cast iron Piston

All three of these pieces are machined to the limits and class of finish specified, *on ONE machine — the 5 DE Automatic — with ONE combination set of tools designed by the ingenuity of P&J specialists backed by fifty years' experience in this special kind of tool engineering.*

Perhaps *your* varied parts production can be put on a similarly profitable basis. It pays to check with P&J – you stand to gain in production, in fewer rejects, in economy, in divided labor costs. Simply send your parts or prints to P&J for tooling recommendations and estimates.

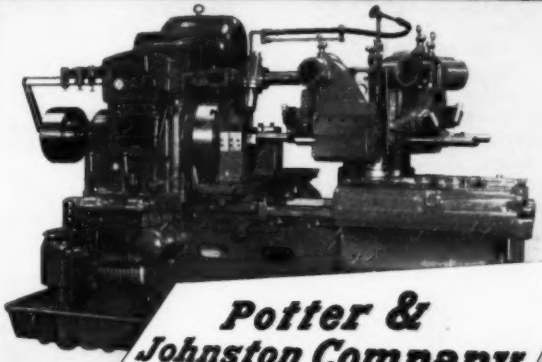
3 SEPARATE JOBS

RETAINER	SHEAVE	PISTON
		

3 SEPARATE OPERATIONS

RETAINER	SHEAVE	PISTON
Rough turn hole Rough turn dia. Rough turn O. D. Face flange Face end Finish-machine above 5 operations Machine groove in O.D. Chamfer hole Size bore hole Cut off chucking ring (Note overhead Cut-off Attachment)	Rough bore hole Rough turn O.D. Straddle face at rim Groove in O.D. Straddle face hub Finish bore hole Form 30° angle in groove Ream hole	Bore under rim Turn hub; face bottom Turn O.D. Rough bore hub Face, chamfer at rim Finish face hub Core drill hole Rough turn O.D. Face rim; turn hub Machine O.D. grooves Face hub; form web Finish face hub Finish turn O.D. Finish bore hole Chamfer; ream hole

MACHINED ON *One* P&J AUTOMATIC
P&J-TOOLED FOR ALL *Three* JOBS



Potter & Johnston Company
Pawtucket, R. I.
subsidiary of Pratt & Whitney
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P&J AUTOMATICS...
tooled for Production - Speed - Economy
at Production Tooling Headquarters

GEAR PRODUCTION HIGHLIGHTS

Cutting-Shaving-Checking-Lapping

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

New Production Line Gear Shaver For Heavy Duty Gears

Designed as a PRODUCTION machine, the new Michigan Model 873 rotary gear shaver (Fig. 1) brings to the finishing of heavy duty gears the ability to turn out such gears faster, more accurately and at lower cost. Completely automatic in operation, the 873 will handle spur or helical gears and involute splines of from zero (with 10" cutter or larger) to 18 or 24 in. diameter, and with face widths ranging up to 15 in. Once the machine is set up for a given gear type, it is necessary only to load the gear between centers and push a 'start' button to complete the entire operation.

Features of the new Michigan 873 include ability to shave gears by any of three methods—

1. UNDERPASS—(Fig. 2) tangential feed; one roughing and one finishing pass usually enough for any gear (up to 4" face). For finishing close shoulder gears, etc.; evenly distributed cutter wear.
2. TRAVERPASS—(Fig. 3) combined tangential and axial feed of the cutter. Evenly distributed cutter wear; cutters narrower than underpass. (Gears up to 5" face)
3. TRANSVERSE—(Fig. 4) infeed; rapid approach plus a slower intermittent infeed. For finishing widest face gears (up to 15" face) with narrow cutters.

Curve Shaving. Ability to curve-shave (crown) either narrow or wide face gears by any of the above three methods. Adjustable power-driven sine-bar mechanism rocks the work table about a center pivot for transverse and some traverpass shaving. Others curve-shaved by use of reverse-crowned cutters.

Floor Space. Greatly reduced compared with previous machines designed for handling large gears.

Controls. All controls located at front of machine.

Faster Cutting, due to inclusion of a 'rapid approach' feed in the machine cycle, and automatic in-and-return feed.

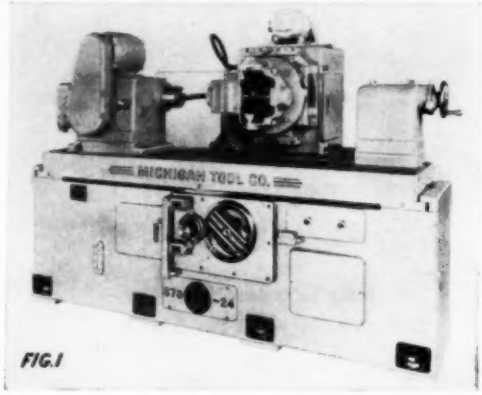


FIG. 1

Internal Gears. Special interchangeable cutter head provides for finishing internal gears on the 873.

Adjustments of the 873 have been kept simple for fast setup. Crossed axis setting is speeded by adding a five ten-thousandths indicator to the conventional vernier arrangement. Any of the three shaving methods may be selected by rotating the slide for the cutter head into proper position, mounting the correct cutter, adjusting center distance (by hand wheel at front of machine), and setting machine cycle. Limit switches regulate cutter reciprocation and head infeed.

Specifically designed for production line operation, the machine enables the use of unskilled or semi-skilled operators, further reducing costs. The operator merely loads the gear between centers and starts the machine by pushing a button. At the end of the complete machine cycle, the operator merely reloads. Machines are so designed that an overhead crane or hoist can be used to lower heavy gears directly between the centers.

For further information on the new 873 gear shaver, ask for Bulletin No. 873-49.

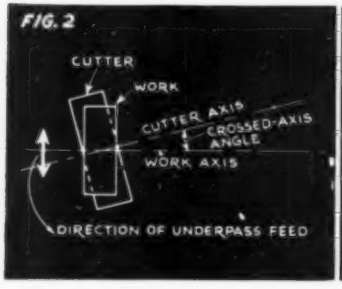


FIG. 2

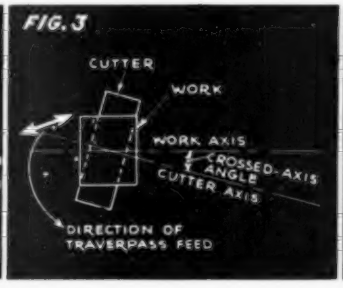


FIG. 3

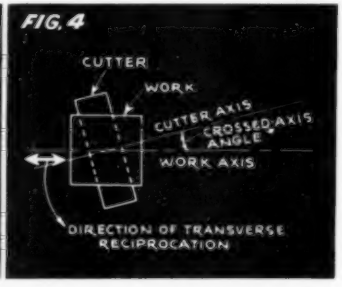
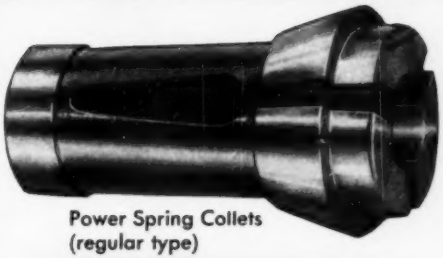
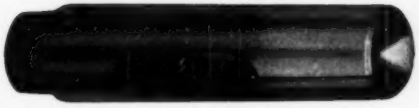


FIG. 4

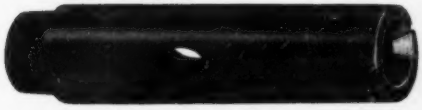


Power Spring Collets
(regular type)

Power Spring Collets
(taper nose type)



Feed Fingers (regular type)



Master Feed Fingers and Pads

Master Feed Fingers
with Adjustable Tension

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For maximum production efficiency, specify Hardinge precision products for your Brown & Sharpe Automatics and Wire Feed Screw Machines. Reduce tooling costs and step up production with these and other Hardinge precision products engineered, customer-shop tested, and approved for Brown & Sharpe machines. Write for Catalog 36 — contains complete descriptions, specifications, and ordering information.

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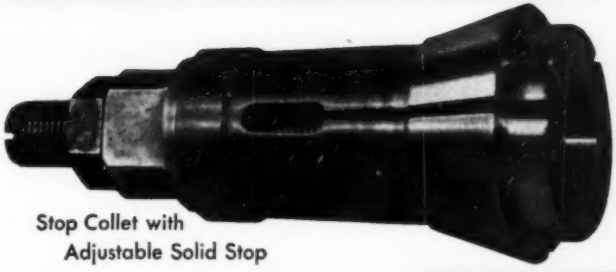

Stop Collet with
Adjustable Solid Stop

Stop Collet with
Adjustable Spring Ejector Stop

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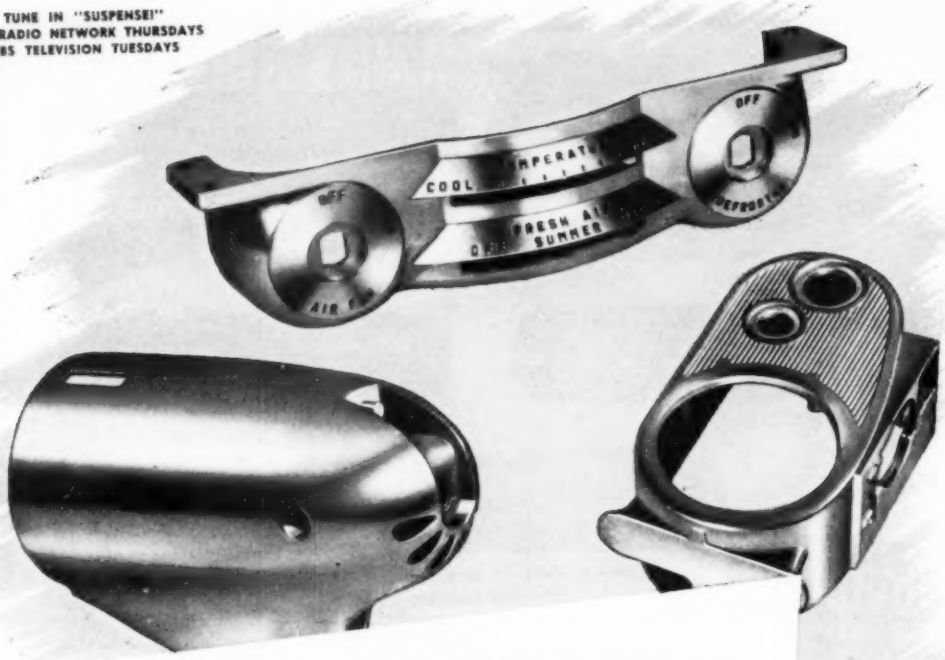

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DIE CASTINGS

● Increased production facilities for die castings made possible through the famous Auto-Lite "controlled metals" processes are now available. The opening of the great new Lockland plant of Auto-Lite, combined with the enlarged facilities at Woodstock, Illinois, greatly increases Auto-Lite's ability to furnish high quality die castings.

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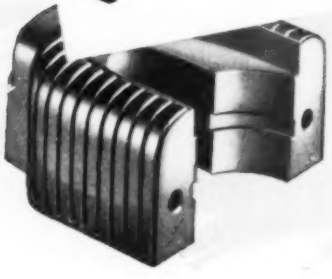
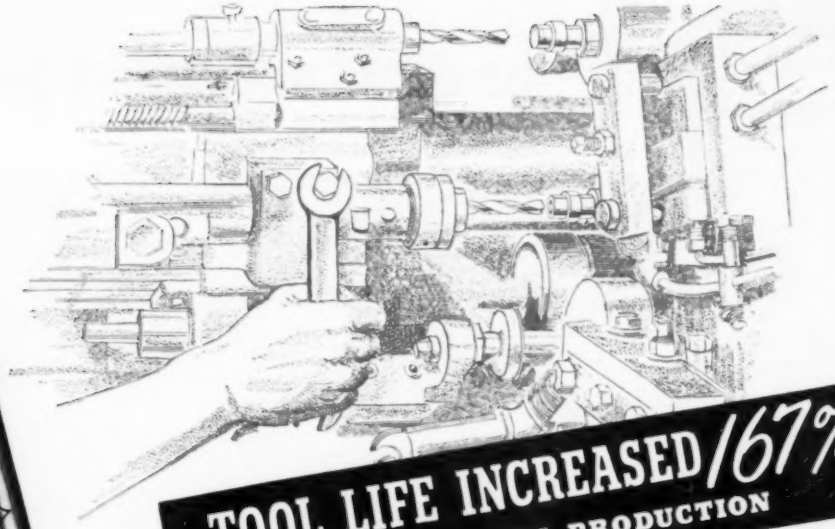


Inquiries invited

Catalog will be sent on request.
Write on your company letterhead.



TOOL LIFE INCREASED 167%

. . . WITH 8% MORE PRODUCTION

by using Cleveland drills at correct feed and speed

For best results in automatic screw machines, you naturally choose the finest, most durable tools—such as the CLE-FORGE High Speed Drill shown here. But this alone is not enough. A few months ago one of our Service Representatives was making a survey in a customer's plant. On a six-spindle automatic he reduced the speed from 1740 to 1566 r.p.m. and increased the feed from .0035 to .0042 f.p.r. Result: Drill life jumped from 1½ hours *to 4 hours.* A *Cleveland* Service Representative may be able to effect similar savings for *you.* Contact our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor

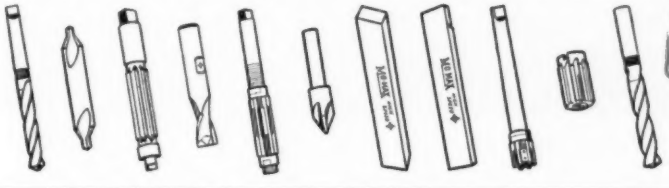
THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 11

E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



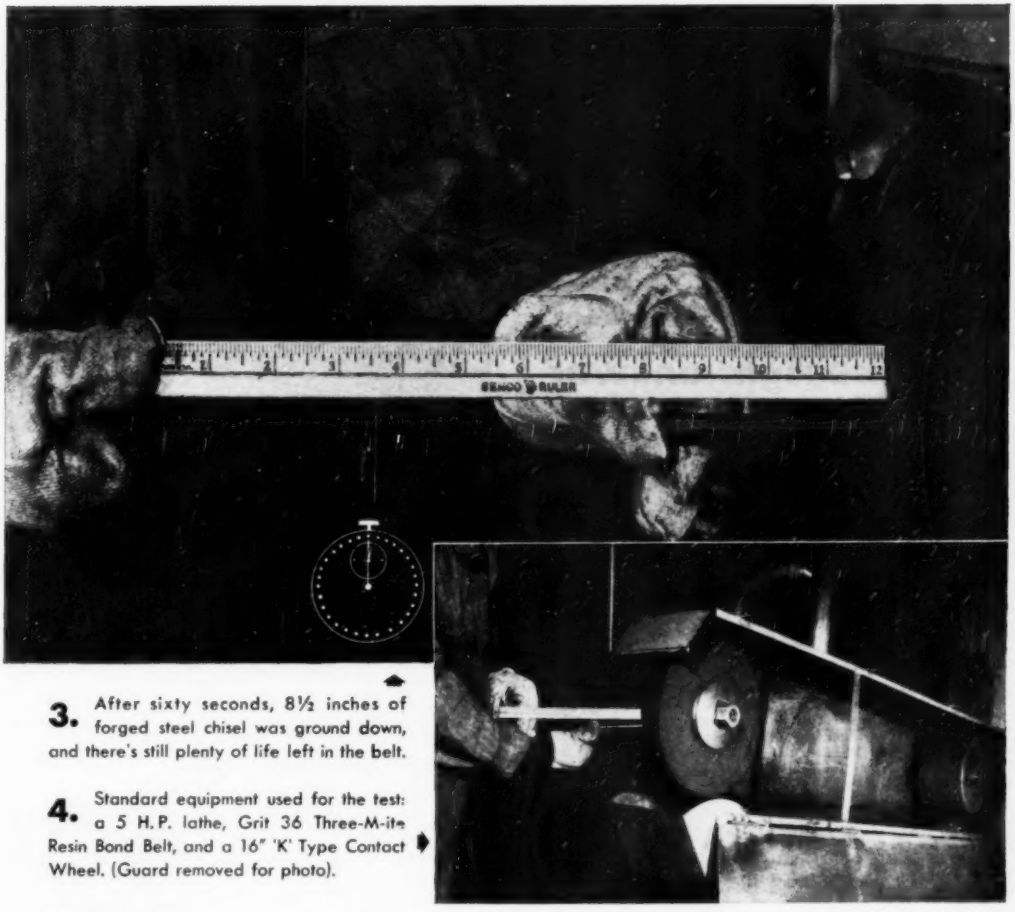
PICTURE STORY *Illustrating*

the speed and cutting power

1. We took a forged steel chisel, one-half inch in diameter, and started grinding POINT FIRST against a Grit 36 Three-M-ite Belt.

2. After twenty seconds we'd ground away over 3½ inches of chisel, (the belt travelling over two miles a minute).

# of 3M Abrasive Belts ...



3. After sixty seconds, 8½ inches of forged steel chisel was ground down, and there's still plenty of life left in the belt.

4. Standard equipment used for the test: a 5 H.P. lathe, Grit 36 Three-M-ite Resin Bond Belt, and a 16" 'K' Type Contact Wheel. (Guard removed for photo).

THIS unusual test is our way of dramatizing a new production principle, heavy grinding of ferrous or non-ferrous metals with 3M Coated Abrasive Belts.

In case you're not familiar with the speed and cutting power of 3M Abrasive Belts on heavy grinding jobs requiring a high rate of stock removal—we've compiled a booklet that's replete with "case histories" illustrating the potentialities of this modern grinding tool. To get your copy address your request to Dept. AM, Minnesota Mining and Mfg. Co., St. Paul 6, Minn.

Made in U.S.A. by **MINNESOTA MINING & MFG. CO.** *St. Paul 6, Minn.*

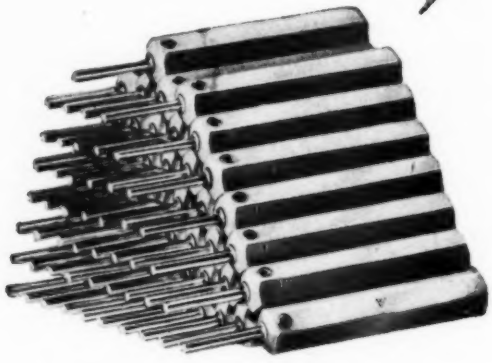
Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "UNDERSEAL" Rubberized Undercoating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Adhesives.

General Export: Durex Abrasives Corp., New Rochelle, N. Y.
In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario

3M ABRASIVE BELTS

Van Keuren

CARBOLOY
Wire Type
PLUG GAGES
are the right answer



1 VK CARBOLOY=50 TOOLSTEEL GAGES

After considerable experimentation with various wear resistant materials, we have chosen Carboloy as being the most practical, durable and economical. Carboloy does not flake or chip easily and is quite suitable for wire type plug gages as small as .020" in diameter.

Wire Type Plug Gages were originated by the Van Keuren Co. in 1925 and are now recognized as the most economical gages for measuring small holes. The original wire type plug gages were made of tool steel—High Speed steel doubled gage life. VK Chromium Plate gave 5 times the life, and VK Carboloy 50 times the life of tool steel gaging units. All of these materials are still in use and have their particular applications.

VK Carboloy gaging units are made in sizes from .020" to .500" diameter. They are made only in the wire type design because this is by far the most economical plug gage. In cases where it is desired to use VK Carboloy wire type Go units with existing No Go taper insert unit, special handles can be furnished for this purpose.

Van Keuren Wire Type Plug Gages assure longer lasting precision and lower gage cost, because the entire 2" length of gage can be used. When the end of the wire becomes worn, it is ground off. The wire type unit is securely held in the unit by a split bushing and a headless set screw.

VK Carboloy Wire Type Plug Gages are made to Class B accuracy, plus .00005" minus, .00000" on the Go unit and plus or minus .000025" on the No Go unit. Closer or wider tolerances can be supplied if desired.

On your next order Specify VK Wire Type Plug Gages; VK Carboloy for long runs because of the enormous saving in gage cost; VK Carboloy for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits; VK Tool Steel—High Speed Steel—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

CATALOG AND HANDBOOK No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

30th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Variable Idle Time Control
Gear Box Transmission Support
Idle Time Movement Brake Adjustment
Headstock Transmission Support
Endworking Attachment Spindle Mounting
Support by Work Spindle Carrier
Tool Holder Anchorage
Approved Types of Clutc
Job Changeover Facility
Power Reverse Drive Support to All
Machine Builder's Block and Line Test
Material and Fir
Proximity of Front Be
Proximity of Front Bearing to Spindle
Support by Work Sp
Support by Main End Slide
Support by Work Spindle Carrier Indexing Fac
Length of Standard Main End Slide
Top Member Support to All Headstock and Gear Box Members
Maximum Machine Main End Slide Load Recommended
Support by Main Cross Slides
Form Tool Holder Interchange
Location of Tooling Stations in Respect to Chip Clearance and Size Control
Gear Material, Size and Finish
Main Cross
Main Cross Slide Po
Main End Slide Replacement
Camshaft Replac
Maximum Overhang

BUYER'S
COMPARISON CHART
FOR
MULTIPLE SPINDLE AUTOMATIC
BAR MACHINES

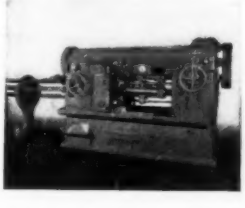
THAT'S WHY BUYERS ARE BORN

Buyers are indispensable in the evaluation of machine facility to meet particular requirements. If all machines were perfect there would be less need of Buyers. Perfect machines would meet all requirements.

But there are no perfect machines, and requirements vary with the many conditions at individual plants. The selection of a machine does not necessarily mean that it unqualifiedly fills all requirements. It may, in comparison with other machines, come closer to filling them.

In comparing one machine with others of the same type, an analysis chart can be very helpful. The subject should be thoroughly covered, and equal opportunity should be available to all machines compared.

CONE has made available an analysis chart for the horizontal type, multiple spindle, automatic bar machine. You will find it interesting and different. Write for free copy. There is no obligation.



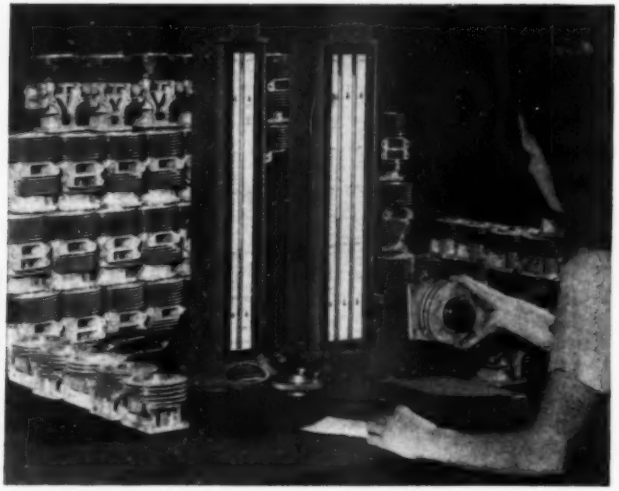
A comparison with ALL Automatics will lead you to

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Does your budget prevent your Common Sense from saying

YES?



A CHANGE IN GAGING ROUTINE AS WELL AS IN GAGES

cut out one inspection, reduced scrap, and eliminated fatigue. When the Van der Horst Corp. of America, Olean, New York, first had the job of porous chrome plating the bores of aluminum cylinders, they had to gage each piece before plating. Now the cylinders are carefully gaged at production, thus standardizing and simplifying the plating process. After plating they are inspected at three points simultaneously for diameter and out-of-round. Tolerances for diameter are .002" and .0015"; for out-of-round, .001". Change from old style gages to Federal Air Gage has increased inspection speed (including visual inspection for hone marks, bare spots, and porosity) from 150 to 250 parts per hour. To date there has been *no* maintenance cost.

Budgets are necessary guides for routine departmental expense. But, routine methods are not always the most economical, and if there is a better way to do the job — *at less cost* — you can beat the budget.

Some executives have an old-fashioned idea that gaging is a non-productive or overhead cost. Proper gaging, properly tied into production, not only *pays for itself* — it actually pays some of the cost of production. Facts prove that a carefully selected Indicating or Visual type of gage shows the workman *how he is doing*, keeps his production in dimensional control, and prevents waste in scrap, machine time, and manhours. Remember, you *cannot* sell scrap at a profit or get back lost time.

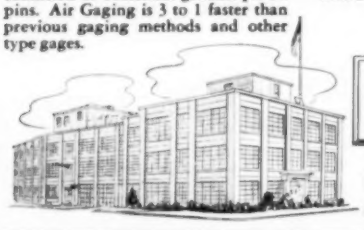
Read how the right gage is paying off at the Van der Horst Corp. See if you have cases in your plant where a change in customary procedure will help. It won't obligate you at all to consult us about gaging improvements — you may find a way to beat the budget. Write Gaging Headquarters —

Federal Products Corporation, 1102F Eddy St., Providence 1, R. I.

Three-point measurement by this gage immediately shows up out-of-round condition of centerless ground piston pins. Air Gaging is 3 to 1 faster than previous gaging methods and other type gages.

Gaging the inside width of a rectangular hole is easy and more accurate with a Federal Air Gage.

Sphericity, angularity, and two depths are checked simultaneously with this combination Federal Dial Indicator and Air Gage. A real time saver.



FEDERAL

PRECISION MEASURING INSTRUMENTS

DIAL INDICATORS • INDICATING GAGES • SPECIAL GAGES • ELECTRONIC AND AUTOMATIC SORTING GAGES • AIR GAGES

New Savings
IN PRODUCTION DOLLARS

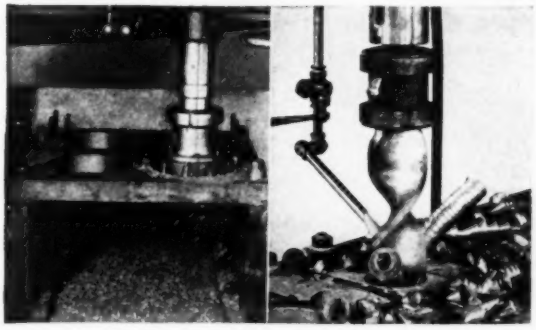
Track mounted—with equalized power clamping to the heavy rails—controlled by push buttons on head.

684 drilling operations on a Diesel Center Frame now completed in 17 hours—a 7-hour saving effected by this Cincinnati Bickford Super Service Radial.

"Easy Reach" levers—low on the head—control every operation from column clamping, speeds and feeds, to raising or lowering the arm.

These low controls save the operator steps, give him a clear view of the work, and increase his production.

Send for new Bulletin R-29 showing latest design features.



• Unusually long spindle sleeve bearing permits boring without pilot bar.

• 4" drill in steel at 78 r.p.m.—.017" feet per revolution—it takes power.

Equal Efficiency of Every Unit Makes the Balanced Machine

Our 75TH Year
CINCINNATI BICKFORD
1874-1949
METAL DRILLING MACHINERY
SUPER SERVICE

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

DANLY DIE SETS

less time

IN THE DIE SHOP

Reliable Danly precision makes die assembly quicker and easier . . . possible reworking of die sets to make them square and true is eliminated. Precision leader pin and bushing fits assure accurate die closure and protect delicate die components. Danly Die Sets mean better dies in less time!

longer life

ON THE PRODUCTION LINE

Hardened, ground and lapped leader pins resist wear . . . accurate die relationship minimizes punch shearing and die breakage. Precision Danly Die Sets justify die maker's precision in the press setup, preventing premature die wear. Danly Die Sets mean more parts per grind!

Courtesy Quality Hardware, Chicago

Danly precision makes every Danly Die Set a reliable foundation for the finest die work. And in addition to the performance advantages they assure, Danly Die Sets are quickly available, too, from a nation-wide system of completely stocked assembly branches.

Large or small, standard or special, there's a Danly Die Set to meet every tooling need. Just contact your nearest Danly branch for fastest delivery of the best in die sets.

Danly Machine Specialties, Inc.
2100 South 52nd Avenue, Chicago 50, Illinois.

WRITE FOR THIS FREE BULLETIN

. . . and see how Danly's special die set machining service can help reduce your costs.

WHICH DANLY BRANCH IS CLOSEST TO YOU?

*Chicago 50, 2100 South 52nd Avenue
*Cleveland 14, 1550 East 33rd Street
*Dayton 2, 990 East Monument Avenue
*Detroit 16, 1549 Temple Avenue
*Grand Rapids, 113 Michigan Street, N.W.
*Long Island City 1, 47-28 37th Street
*Los Angeles 54, Ducommun Metals & Supply Co., 4890 South Alameda
Milwaukee 2, 111 East Wisconsin Avenue
Philadelphia 44, 18 West Chelten Avenue
*Rochester 4, 16 Commercial Street

*Indicates complete stock

DANLY

DANLY PRECISION DIE SETS . . . STANDARD AND SPECIAL

OVER 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

SPOT NEWS OF METALWORKING

Just what types of American-made tools will continue to be in demand in western Europe will soon be known in detail by U.S. machine tool builders. ECA in Washington now has a complete list of tools in demand but manufactured only in the U.S. The list right now is classified, by Marshall Plan countries themselves, but ECA officials hope soon to have it cleared for release.

Television manufacturers are changing from short-run to mass-production tooling and cost of some parts will drop 75% as compared with a year ago.

All major aircraft plants in southern California are working two shifts, with outlook for 1950 generally good. All major plants have enough backlog to carry them through 1950, and one at least, Lockheed, claims orders through 1951.

WAA will be cut to a staff of 675 from its present payroll of 2033. WAA once had 59,000 employees handling $25,600,000,000 worth of property. Those remaining will liquidate $1 billion in surplus real estate.

The military isn't planning to move your plant away from our "vulnerable seacoasts," rumor to the contrary. It would cost too much. More important thing to look into is your location within the local industrial community. Are you at least three miles from nearest important bomb target? (See story page 125.)

A method of welding metals by pressure at room temperature, developed in England, has been introduced here. The process can be successfully applied to several types of non-ferrous metal—aluminum, duralumin, cadmium, lead, copper, nickel, zinc, and silver. More important application now is for cold welding of aluminum. Process is controlled in the United States by Koldweld Corp., New York.

Zirconium boride, which can withstand temperatures up to 6000 F, has been developed under an ONR contract. The alloy has survived higher temperature blasts than any material tested extensively to date. It may be used in gas turbines, and jet and rocket engines.

Kaiser-Frazer assembly in India will be a dead letter very shortly. Backers of the licensees are selling the still-incomplete plant to the British Rootes group as a base for that firm's new Indian venture—thus giving Rootes a big lead on Austin and Standard in their schemes for Indian assembly plants. Kaiser assemblers there have put together less than 1000 American units in the past two years.

X-ray exposures of selected planes within an object are now possible through use of a spiral laminagraph developed by the Naval Ordnance Laboratory at White Oak, Md. When the instrument is in operation, the film and object are in continuous, synchronous motion with respect to the X-ray tubes. In earlier laminagraphs, tube and film moved in synchronism with respect to a fixed object.

Ford is planning to build a new transmission manufacturing plant at Cincinnati. The site has not yet been decided upon. This new plant is part of the company's long-term decentralization policy on production and will require large expenditures for new equipment.

Studebaker has a large 1951-model retooling program, for which orders are likely to be placed before the end of the year. Chrysler also has plans for a new engine for its Chrysler series, to be produced at its Jefferson Ave. plant in Detroit.

Gaging Metalworking

Many machine tool builders say that orders have been considerably better the past two weeks. October is estimated to have shown at least a mild improvement over September for the industry. A large volume of business is pending.

The outlook is for an increase in bookings during the current month. Ford is placing orders for its new toolroom and for production purposes at its Buffalo plant. Automotive buyers comprise the most promising single source of machine tool business for many months ahead. Studebaker and Chrysler, both in its Dodge and Chrysler divisions, will purchase large numbers of machines for 1951 engines. Ford also has elaborate plans for retooling and modernization.

West Coast Tooling Favorable

Reports are more favorable regarding machine tool orders on the West Coast, particularly from the aircraft industry. Wright Field is in the midst of distributing some sizable orders for machines to make jet engine maintenance parts. Moreover, the tooling program for a brand new jet engine for the Air Force is close at hand. The arms for Europe program of the government probably will result in some machine tool business for U.S. builders.

Large Press Orders

Mechanical press builders relatively are in a much better position than machine tool companies so far as backlogs are concerned. They have benefited partly from large orders from a few sources, such as the Ford stamping plant at Buffalo. At least a few press builders are operating more than 40 hours a week to keep abreast of delivery promises.

Appliance Orders Heavy

Orders for appliances have been running ahead of production since early September at Hotpoint and a similar situation applies with other manufacturers. Hotpoint says that even if the steel strike had not curtailed production it would have been necessary to work all departments full time to the end of the year to meet increasing demands.

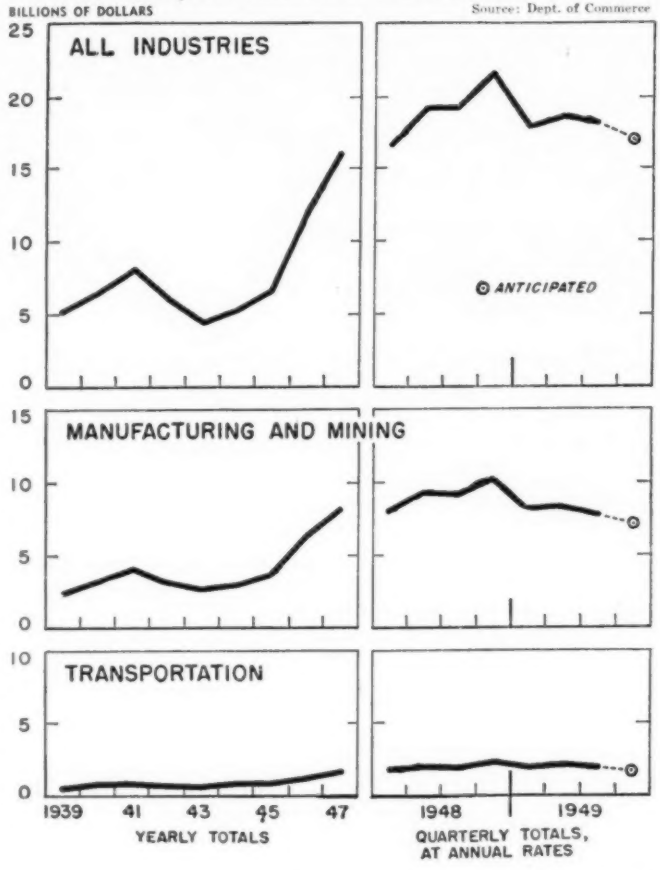
Factory sales of standard-size household washers in September soared to the highest total since October, 1948, according to industry-wide figures announced by the American Home Laundry Manufacturers' Assn. The September total was 357,281 units, compared to 323,789 in August, an increase of 10.3 percent. September washer sales were 146 percent greater than the 145,194 units sold in the comparable month of 1941, the industry's best prewar year.

Effects of Strikes Felt

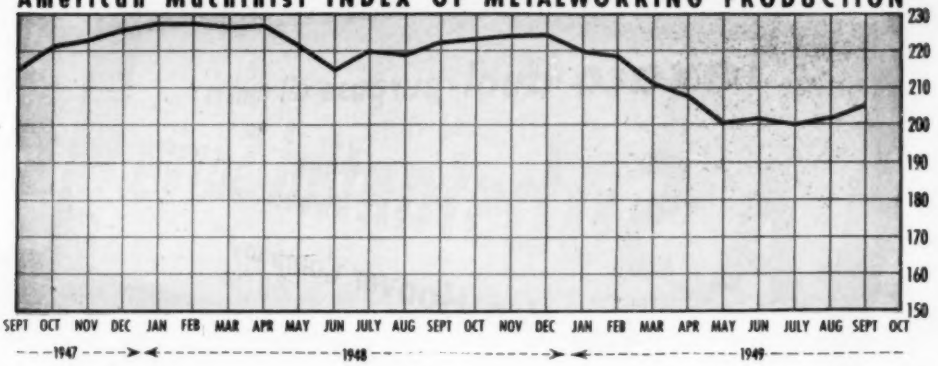
Effects of the steel strike will be felt for several months after all steel mills and the union have reached an agreement. Cold-rolled sheets, for instance, will remain in short supply through the early part of 1950. The ability of users to secure any type of low-carbon sheet and strip has almost disappeared temporarily. Warehouse stocks of strip steel have been pretty much depleted.

Until November 1, the strike had not affected metalworking operations seriously. The middle of the month had been set as the critical point at which plant shutdowns and unemployment would really hurt the economy badly. The Bethlehem settlement relieved the situation somewhat. But the precipitate decline in steel output from 1,590,000 tons per week to only 172,000 tons naturally has retarded Metalworking from running at a higher rate during the autumn weeks.

PLANT, EQUIPMENT EXPENDITURES DROP



American Machinist INDEX OF METALWORKING PRODUCTION



	INDEX	COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
Sept. 1949 (preliminary)	205	194	196	247	291	136
Aug. 1949	201	192	192	244	288	135
Sept. 1948	222	249	231	227	308	154

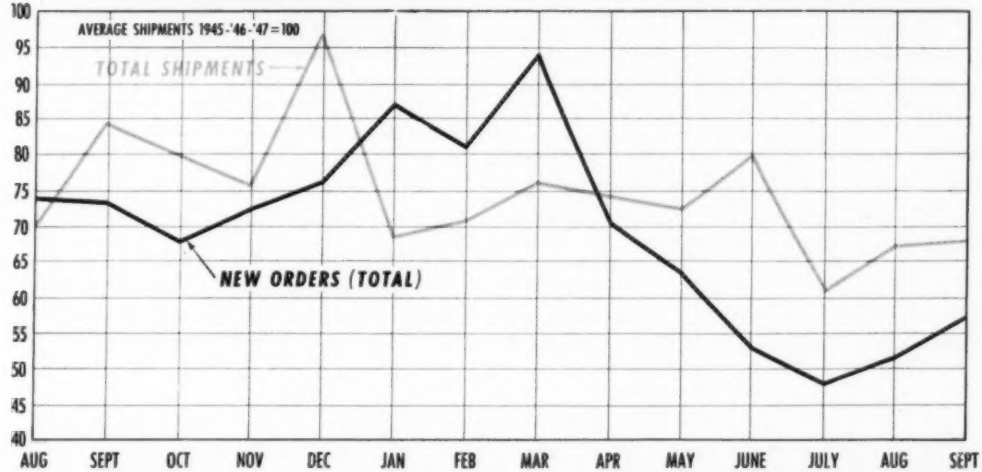
AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

Few Takers for High Priced Steel

Despite the fact that some consumers got caught short on steel, dealers and brokers in the midwest offering premium-priced steel have found few takers. Average price quoted for sheet and bar stock has been about $20 a ton over the market. Though spot shortages have developed in plates, bars and shapes, many users have enough tonnage to last until about December 1. A similar situation exists in pipe and tubing.

Steel shortage is pushing back plans of many metalworking firms which are planning on bringing out new products. Tool and die work has been delayed, the result being that announcements of many new items will be deferred from the first to the second quarter of next year. Contract shop owners are optimistic about sales in the first quarter.

SHARP INCREASE IN NEW ORDERS FOR MACHINE TOOLS



	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT
New Orders (Total)						87.0	80.9	93.5	70.1	63.7	53.6	48.0	51.5	p57.7
Foreign Orders (Included in Total)						21.9	26.5	22.3	23.1	15.9	15.7	14.0	18.8	p13.7
Shipments (Total)						68.8	70.3	75.8	74.9	72.8	79.0	60.7	67.3	p67.6

Data: NMTBA

p—preliminary figures

Texaco dual-purpose oil makes A Substantial Saving for the Hoover Company

Motor shafts for the famous Hoover Electric Cleaners are produced on this 9/16-inch Acme Gridley automatic screw machine. *Texaco Cleartex Cutting Oil* serves as both cutting coolant and machine lubricant.

In the North Canton, Ohio, plant of The Hoover Company, pioneer maker of electric cleaners, the machining operation illustrated formerly required two lubricants — one for the machine, the other for the cutting tools. End result was contaminated oil that had only scrap value.

A Texaco Lubrication Engineer recommended *Texaco Cleartex Cutting Oil*, designed to serve as both cutting coolant and machine lubricant. *"By using this dual-purpose oil,"* says The Hoover Company, *"the used oil can now be salvaged at a substantial saving."* In addition, *Cleartex* keeps machining efficiency high, assures excellent finish, prolongs tool life.

Texaco Cleartex Cutting Oil is only one of a complete line of Texaco Cutting, Soluble and Grinding Oils designed to do machining jobs better, faster, at lower cost.

Let a Texaco Lubrication Engineer specializing in machining operations help you achieve these benefits on all your metal working. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Replacement Plan Pays Dividends

A well-known metalworking company has spent over half a million dollars a year on new production equipment since the end of the war.

When we heard this news, we assumed the management had been following a specific replacement policy. But our hopes were dashed when we questioned the president.

Here is the explanation: The company had a lot of old machines in use. Its business was good and its profits better than average. It merely took advantage of the situation to junk much of its ancient equipment in favor of new machines.

It does not intend to keep up its replacement program next year. It feels that it is pretty well caught up on new machines for several years ahead.

As against this company, take the case of another fabricator. Its president claims that it has a well-defined machinery replacement plan. He outlined it to us.

Then we talked to the general master mechanic about it. He professed ignorance of it, said that there is no real plan, and mentioned a few halfway measures which have been taken.

Further probing showed that the president only thought that he had a plan. None is actually in use.

If space permitted, we could match these two vivid cases with many others. And in every instance, an honest-to-goodness replacement policy does not exist.

It is rare indeed when we find a company with a real equipment replacement formula.

Such companies stand out like beacons on a dark landscape. For the drab reality is that most managements confess to no policy at all.

Yet the stark truth is that there has been a critical lack of modernization since the war, as revealed by American Machinist's Mid-Century Inventory of Metalworking Equipment.

At the time when cost-cutting has taken on a new importance, when price competition is pressing hard, this situation constitutes an indictment of metalworking companies. It attests to carelessness and indifference on the part of management.

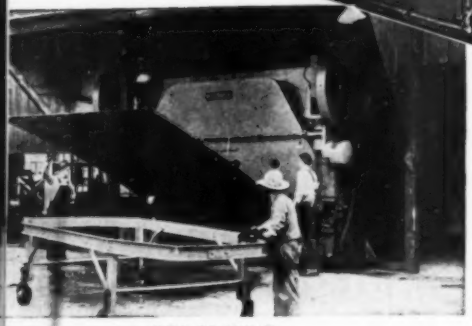
Action should be taken at once to end this deplorable do-nothingness. It should take the form of an enlightened continuous equipment replacement program, sponsored by individual companies.

Such a program has paid handsome dividends to the few companies which have tried it. You, too, will find it profitable.

Burnham Finney

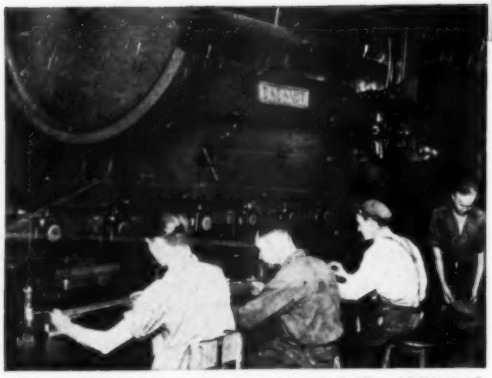
EDITOR

Use a Press Brake...

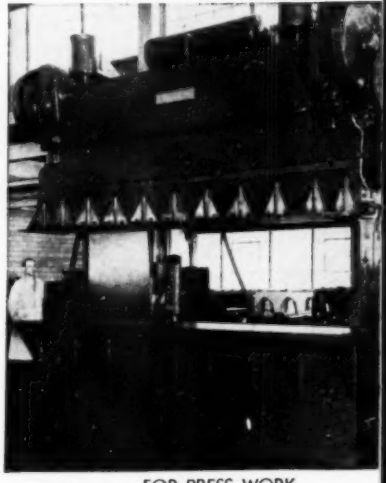


FOR BENDING

FOR MULTIPLE PUNCHING



FOR PROGRESSIVE FORMING, PUNCHING, NOTCHING



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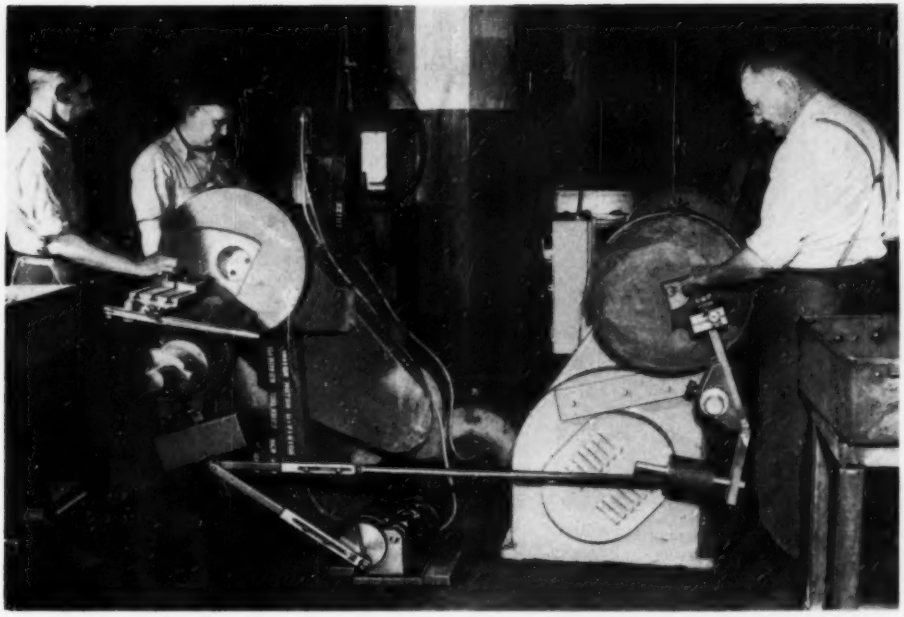


Powered rocking motion of the workrests minimizes effort to grind off burrs or tits on screw-machine products made in small quantities or not adaptable to semi-automatic set-ups. Buick uses a crank rocking device, the crankpin being rotated by a gear reducer and motor set on the floor. Two rocking units serve the four Gardner grinders

Each piece to be deburred is placed in a V-block on the workrest and pushed by hand against the side of the wheel. When the piece has a small hole from which chips must be blown out, the part is placed on top of the fitting connected to an air line. The clean piece is then placed in a totebox

SECOND-OPERATION COSTS REDUCED BY SPECIAL EQUIPMENT

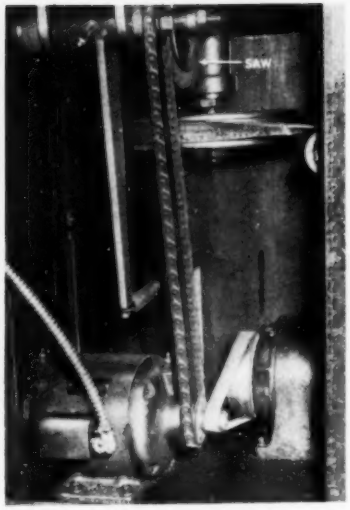
BY THOMAS J. JOHNSON

PLANT SUPERINTENDENT,

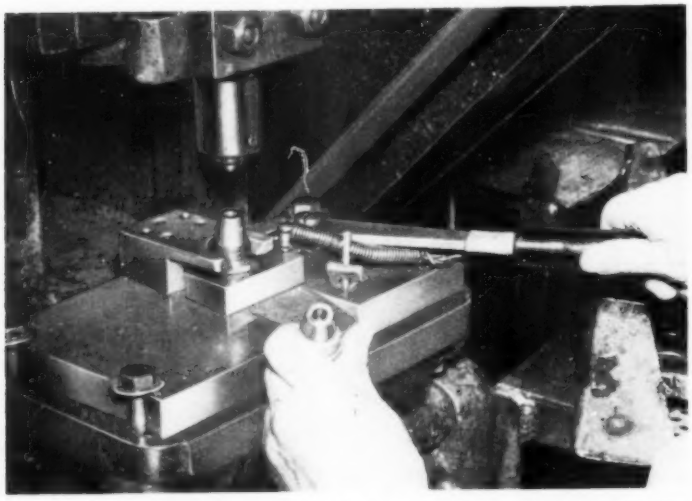
BUICK MOTOR DIVISION, GENERAL MOTORS CORPORATION

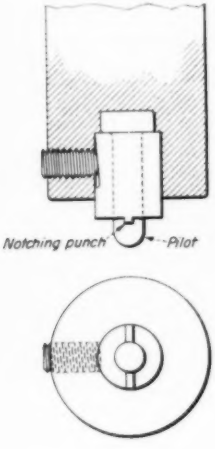
Drilling, deburring and tit removal cannot always be done with screw-machine attachments; hence, it often pays to design tools or special machines for these purposes

continued on next page



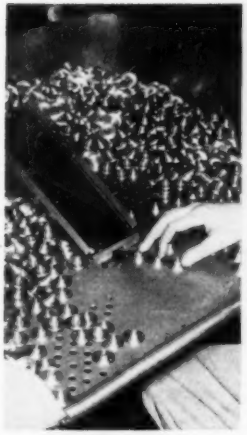
Dial feeding to a circular saw under the table is a safe way of cutting tits off small screw-machine parts. Here the operator is feeding a pump-delivery valve check, which is a button-like disk with a short hub. When the part reaches the back station of the dial, a rubber roller between two weight arms presses the valve check down while the saw beneath cuts the tit off the hub. Screw adjustment of the weight arms and the saw prevents cutting into the hub. The setup is used for several jobs by exchanging dials and making adjustments. The dial is driven continuously by a flat belt which derives power from a speed reducer. A double pulley on the motor shaft permits driving the speed reducer by means of a flat belt and the saw backshaft by means of a V-belt. Saw shaft is supported by a bellcrank hooked to a tension spring, which rocks the saw upward to the cut

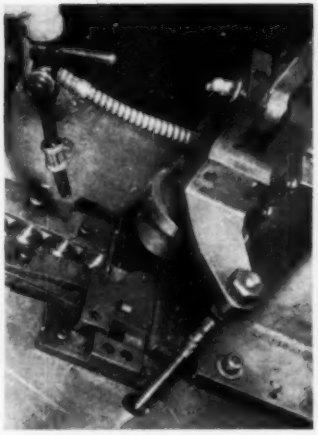




Burrs are prevented in a second operation on a speedometer sleeve by using press tools instead of milling to produce two slots on the end of the piece. A pilot fits the axial hole in the piece to avoid throwing up a burr at this location. When the ram comes down, the pilot enters the hole and then two ears on the punch face indent the metal to form the two slots. Production rate on the press is 800 pcs hr compared to 300 for former slot milling.

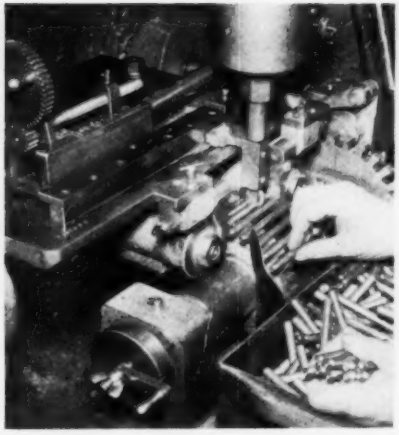
To perform the indenting operation, the operator places the part on a lever-operated sliding fixture. This fixture carries the piece into a nest underneath the punch. After indenting, release of the lever causes the slide to eject the finished part. No filing of burrs, as thrown up by slot milling, is now required



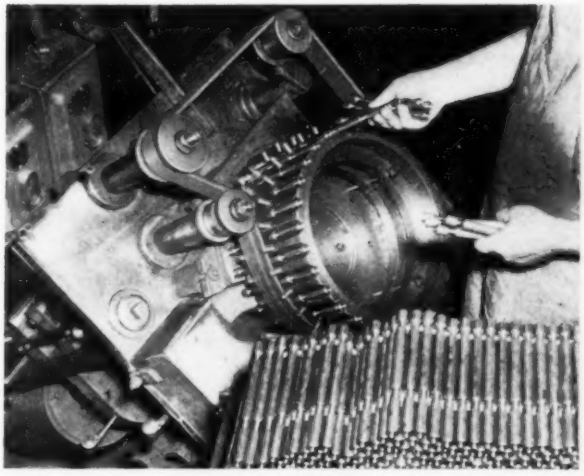


A ring-like burr at the small end of a tapered hole is removed in a shaving die setup. The part, a valve-spring cap, is fed flange side down into an inclined slide. Gravity moves the parts to a gate reciprocated by a bellcrank linked to the press ram. The crosshead or ram of the press makes 78 strokes per min.

When the gate opens, a cap slides into the burring position, where it is centered by a hollow punch member fitting over the hub on the cap. A solid punch within the hollow member then descends to shave the small end of the tapered hole. The shaved scrap is removed in ring-like form and falls out the tapered hole in the part. On the upstroke, the cap is stripped from the punch and falls into a chute. Thereupon, the gate opens and admits the next piece to the die.



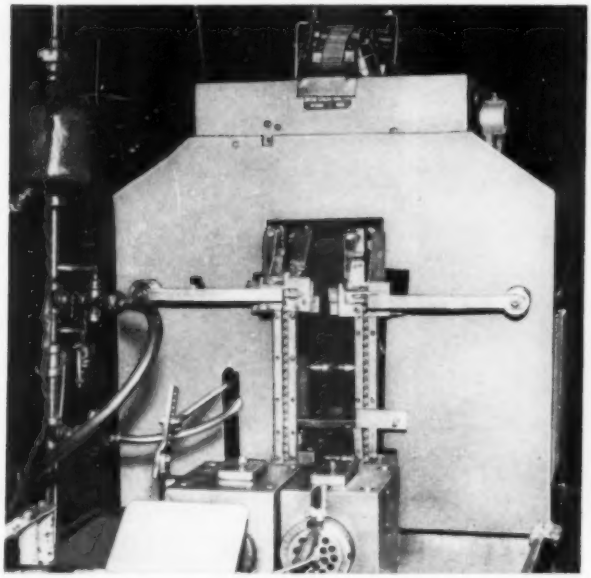
Cylindrical parts of various lengths can have end-burrs or tits removed with a drum-feed machine having two milling cutters. The operator loads into the drum slots, locating each piece endwise against a fixed plate. When the drum indexes to the cutting position at top, a wheel at lower end of a weighted plunger applies clamping pressure. A pin engages the index wheel at right to position the drum, and this pin also controls reciprocation of the cutter heads. Adjustable fingers prevent the cutters from milling into body of the piece. Production, 54 pcs per min.



Grinding is a fast method of removing tits left on one end of shafts by tools that do not cut clear across. For such work a drum-feed machine was devised. As the drum turns slowly about an inclined axis, the operator lays the workpieces in the drum slots, endwise location being established by a plate rest. Contact of the work with the plate is such that the tit overhangs.

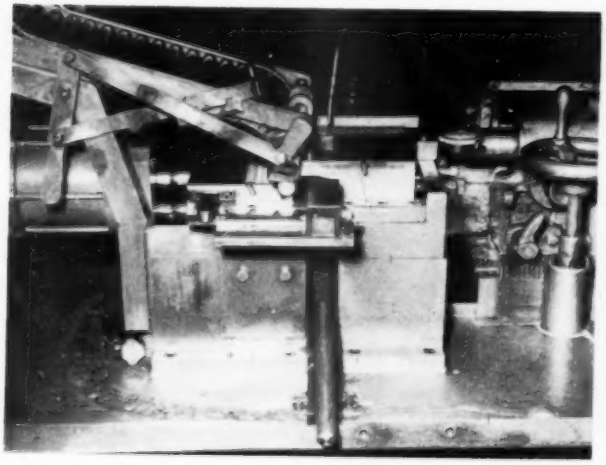
As the drum rotates, the workpieces move under a workbelt that presses them firmly in the slots. Thus axial movement of the work is prevented, as the end face of the work sweeps across the grinding wheel. After passing the grinding wheel, the parts continue in the drum until released by the belt, and they then fall into a chute.

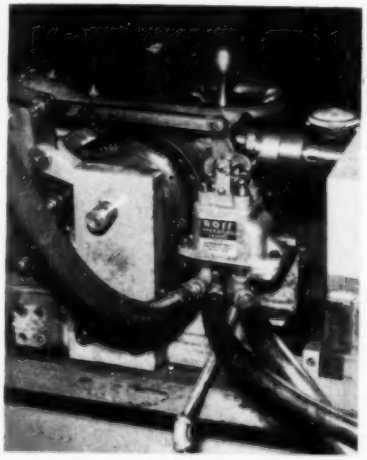
Axial adjustment of the wheel slide compensates for wheel wear. Various lengths of work can be handled



To chamfer and ream a hole in the thimble-like pushrod cap, Buick built a hopper-fed machine that removes the burr from 32,000 pcs per day. Parts are dumped into the hopper at top rear of machine. Recessed steel members, fastened to the sides of a gear wheel, pick up workpieces and feed them into two vertical magazines, hole end out.

A camshaft at rear of the machine controls feeding of workpieces to the fixtures and reciprocation of the tool heads. Latches at the bottom of the magazines are tripped to release one part each; then, the reamer-countersinks are advanced and retracted. Tools are rotated by air or electric motors. After tools withdraw, latches release the finished pieces to a chute, and new ones feed into place. Constant attention is not required, although the operator must check machine functioning at intervals and fill the hopper





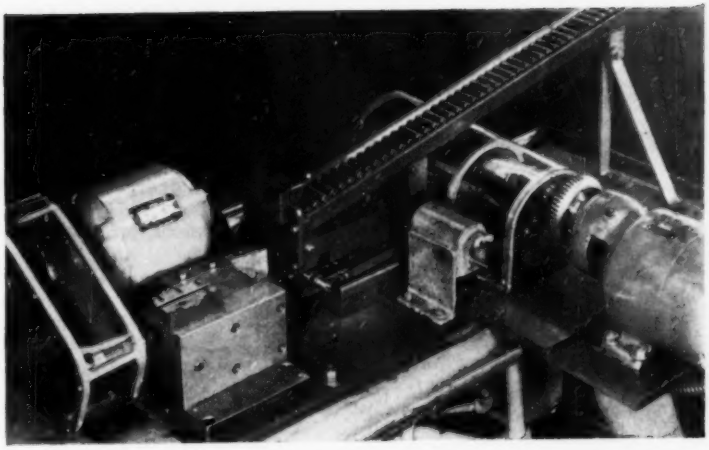
Air feed is used when cross drilling a ball hole in transmission shafts. Parts are loaded into a magazine, and released singly by a rocking shaft. Cycle control is a cam keyed to the feed-gear shaft of a Kingsbury drillhead, which runs continuously. Links and a walking beam operate the plungers of a Ross air valve. Actuation of the plungers control clamping of the work, air feed of the drill to controlled depth, and unclamping.

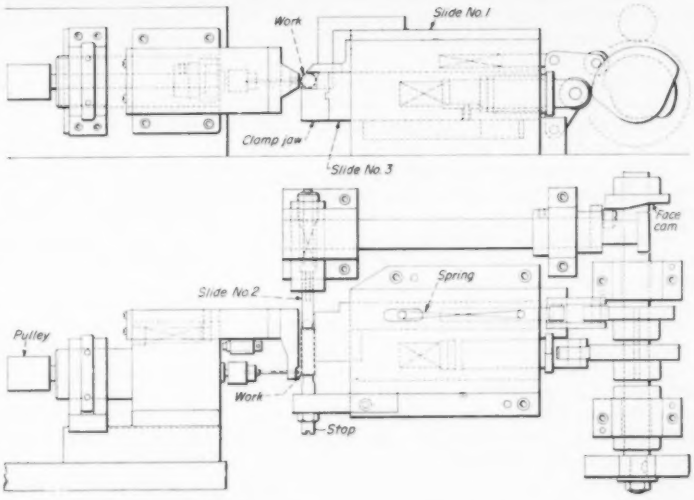
Endwise location of the piece is effected by a key on the clamp-jaw slide and height is controlled by a step in the fixture slide. Axial movement of the Kingsbury unit for positioning is made with a handwheel

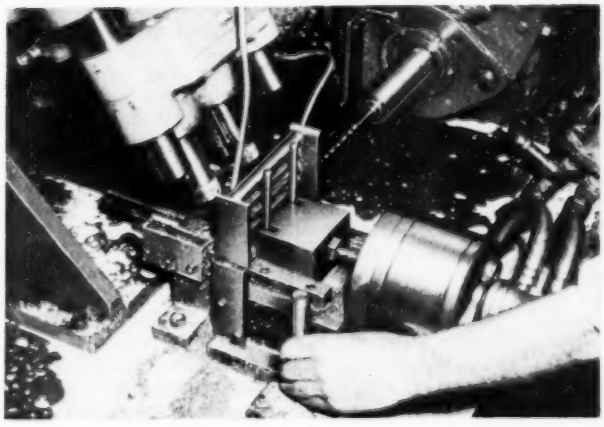
Side hole drilling to controlled depth is required for planetary pinion shafts. The 3/32-in. hole must be drilled 5/64 in. deep. For this purpose, a special cam-operated machine with magazine feed was built to clamp the piece and feed it to a drill spindle incapable of axial motion. Shafts are fed down an inclined magazine.

As a shaft falls into position on a clamp jaw with step, slide No. 1 is advanced by the camshaft to hold down the piece. Slide No. 2 also operates through the medium of a face cam, rocking shaft and rack to move the shaft endwise against a stop. Now, slide No. 3 feeds the clamped piece to depth.

Continued rotation of the camshaft causes the feed slide to retract and the clamping slide to move back. The unclamped piece now falls into a chute and is replaced by a new part. The machine runs continuously and produces 58 pcs per min. If the magazine empties, a latch falls, tripping a trigger and the machine stops. Although the machine works on two shafts of different diameters and lengths, a changeover requires 3 min.







Two drilling operations on pedal shafts are combined on a second-operation machine built up from a Kingsbury drill head and a hydraulic feed unit. Shafts are fed from a hand-loaded magazine and drop onto a ledge on the fixture slide. An axial hole is finish drilled first to a depth of about 1 in. by a hydraulic feed unit. As the drill backs out, an interconnecting link trips the Kingsbury head to drill two cross holes. Since the cycle is automatic, except for loading the magazine and tripping the air valve that controls clamping and the cycle start, the second-operation work on the piece is performed at the rate of 24 sec.

Machine Tools Provide the Competitive

The time has come for users as well as builders to pay more attention to the social and political aspects of machine tools. For machines are significant only as they affect the lives of people

BY L. D. McDONALD
President, National Machine Tool Builders' Association
Vice President, The Warner & Swasey Company, Cleveland

WHEN YOU buy machine tools these days, you purchase only one thing: the competitive edge which protects your profits.

The production potentials of new machine tools are clear to you. But the profit potentials inherent in these new machines as clear to your financial man? They should be.

First, the shop must want the machine. Second, the office must be willing to spend the money.

For years, when you considered buying a new machine, its functional advantages were explained to you. Better cutting tools, faster cutting speeds, greater rigidity, heavier feeds and greater accuracy were stressed.

You were influenced strongly by the physical appearance of the machine. Other important factors came into play, too; automatic controls and other features which enabled the machine itself to do much of the work formerly done by the operator.

Not only was the operator's task lightened. Greater accuracy resulted and full output was realized.

As far as they went, those considerations were all right. But they did not cover the final objective: profit. Profit came from cutting production costs and thus gaining a competitive edge.

The banker on your board, who probably did not know a cam from a collet, often was reluctant to authorize a cash expenditure for something he did not understand, despite your report that "It's a good machine and we ought to have it."

For his benefit it became necessary to translate production advantages into manhours saved, payroll saved, cost reduction achieved, and increased profit made. These factors, in turn, had to be related to the cost of the new machine, book value of the machine or machines replaced, tax depreciation considerations, etc., calculations covering the period of the anticipated profitable life of the machine.

It thus became essential to evolve the method of presenting machine-tool arithmetic to financial men in terms of yield on investment.

That is universal financial language. Such arithmetic, in many cases, proves that capital invested in machine tools will show a higher rate of return over the years than capital invested in any other way.

But after you and the financial man are convinced that new machines are a profitable investment, sometimes stumbling blocks remain. Your workers and the public think that machines destroy jobs.

Some of you have had a habit of talking about "replacing men with machines." My own industry discusses a specific machine installation in terms of reduction in direct-labor cost. We stop right there.

Labor leaders and politicians have preached the "machines-throw-men-out-of-work" theme. The effect unfortunately is that the operator often holds down production on a new machine. If a new machine can turn out 17 pieces per hour, the operator sees that it produces only 13. "Somebody" has told him to "slow down."

The question immediately arises in your mind, "If I can get no more output from a new machine than from the one replaced, why buy the new one?"

An attempt is being made to offset this handicap by building greater ease of operation and the operating pace into the machine itself. That obviously is a limited solution.

The only long-run "out" is to convince the nation's workers that new machines are the best protection against unemployment. As all of us know, new machines make workers' labor easier and more productive; and, in turn, we develop broader markets and achieve greater job stability.

There is a tax hurdle as well as a labor hurdle. Under present federal income tax provisions, new machine tools must be bought partly out of earnings. With the change in the price level the last 10 years, funds recovered through depreciation are insufficient for adequate equipment replacement.

Deficiency Reserves Set Up

Some companies recognize this fact in their earnings statements by setting up depreciation deficiency reserves. These reserves are deducted before reported profits, even though income tax must be paid on them.

The fact is that today a large proportion of what is reported as "profit" is not profit at all. The extent to which depreciation falls short of replacement cost should be set up in a reserve for protection of shareholders. This should be done even if the reserve has to be large enough to take care of the taxes paid on it.

This serious situation was not foreseen by the legislative framers of our income tax laws. It was assumed that depreciation allowances would be

Edge Which Protects Your Profits

sufficient for replacements. Today's predicament is the result of inflation and of high tax rates.

What is needed is a change in the provisions, or interpretation, of our corporation income-tax laws. Otherwise the present tax penalty on modernization may result, in the long run, in a disastrous slowing down of our entire economy.

In the face of today's problems, mind you, the CIO advances the theory that investment of earnings in new equipment is improper diversion of profits. What is spent out of earnings for new equipment should go to the worker in higher wages and to the customer in lower prices.

The CIO says that the money which you spend for new equipment in excess of depreciation allowances should be obtained by borrowing or public financing.

Adoption of such a theory would have two disastrous effects. It would retard drastically your attempts to modernize with new machines. It would freeze your productivity rate, and that of every other manufacturer, at a point which inevitably would lead to inflation or unemployment.

Better wages for your employees and better values for your customers come only from greater productivity. Only as you produce more, can you have more. You can produce more only as you utilize better machines which multiply the effectiveness of the effort of your individual workmen.

What about the "profit" which you get from investment in new machine tools? The truth is that most of it goes eventually to the consuming public through forces of competition. A washing machine today would have a fabulous price tag if it were built by 1900 methods. No one could afford to buy it.

Millions of householders own washing machines because competition dictated that they share in the "profit" made possible by machine tools. Thousands are employed where none were employed before.

"Profit" in our economy is a different profit than the world knew before development of machine tools and of the interchangeability of parts. The ever-present need to secure a competitive edge forces profits out to the public.

You, and we machine-tool builders, face a long-term problem of education. It is the job of making clear to workers that steady employment, better wages, better values and higher standards of living are the direct outcome of higher productivity. New and better machines are the means whereby that higher productivity can be attained.

You must always be keenly conscious that when you install a new machine tool, you are aiding high employment and a higher standard of living.

Your employees should be made aware of this. So should industrial workers generally, the public at large, and people in government.

Improvement is normal in a free capitalist society. Competition sees to that. In our country it is taken for granted that as the years go on, living conditions, education, and health will be better and products will be improved. People will have more comforts and conveniences in exchange for their day's work.

People expect a consistent rate of improvement. This is a basic principle of the operation of competition in free enterprise. Companies which show the most rapid improvement, succeed. Companies which improve too slowly, fail. Simply moving forward is not enough. It's how fast that counts.

When, in a society founded on individual freedom, the rate of improvement falls behind what the public has come to expect as "normal," trouble appears. People begin to question free enterprise. They begin to band together in groups, seeking vainly to gain by such union what, in fact, can be gained only through increased productivity.

Government Takes Over

Under such conditions, men and the groups of which they are a part turn more and more to government. Men become frozen in their jobs. Opportunity vanishes. And finally, government takes over.

There is a direct relationship between the tardiness of modernization in England and the ascendancy of State Socialism. The latter is largely the result of the former. Free enterprise failed to bring the British the things they wanted, postwar, in time.

The same mistaken ideology which led England to its present crisis is at work in our country. Were it to prevail, where would we stand in the cold war, or simply in the enjoyment of life and of better living?

Our course of action is clear. We must produce better things for more people at lower cost. Only then can we prove that ours is the best system.

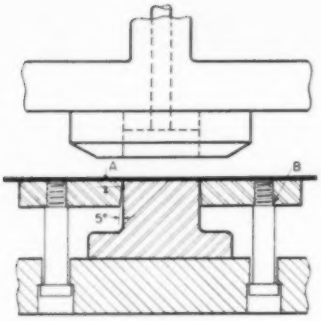
Machine tools are built for the express purpose of enabling manufacturers to provide better things for more people at lower cost. They are America's most effective weapons in the cold war!

These considerations may seem far removed from speeds and feeds. But more and more these days, questions are being weighed in the light of factors which used to be apart from "practical" business.

It would have been preposterous not so long ago to say that modernization of the lathe department of a manufacturing plant—of your plant—would have any relationship to the action of Congress, or to the attitude of the people of Europe toward the United States. Yet that is the case today.

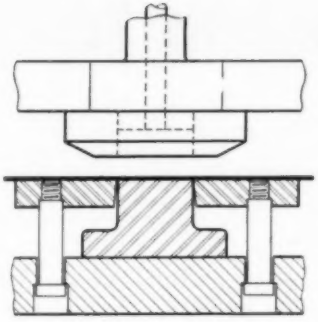
The time has come for machine tool users, and for builders, to pay more attention than ever before to the social and political aspects of machine tools.

Let's remember that a machine in itself is nothing. It is of significance only as it affects the lives of people. Today, this effect is profound. And all of us should recognize it and act accordingly.



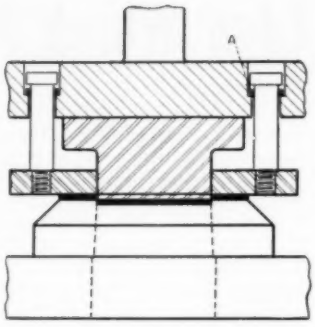
1

Fig. 1...To prevent binding on the punch, the stripper plate is machined to a loose fit, and the opening is straight for a distance $A = \frac{1}{8}$ to $\frac{1}{4}$ in.



2

Fig. 2...Holes counterbored in the stripper plate to receive the shoulder bolts give stronger construction but must be held for depth and diameter



3

Fig. 3...Washers *A* are inserted when the punch is sharpened, in order to maintain the relative position of the stripper plate and punch

Select Spring Strippers According to Die Requirements

Spring stripper plates are made in several ways, depending on the class of the die, its size, and possibility of jams arising while the die is in service

BY J. R. PAQUIN, Tool Engineer
HARTFORD MACHINE SCREW COMPANY

Spring stripper plates possess several advantages over solid strippers:

1. **Fast setup time.** The die is in one unit and may be bolted quickly to the press. There are no loose parts to get lost.

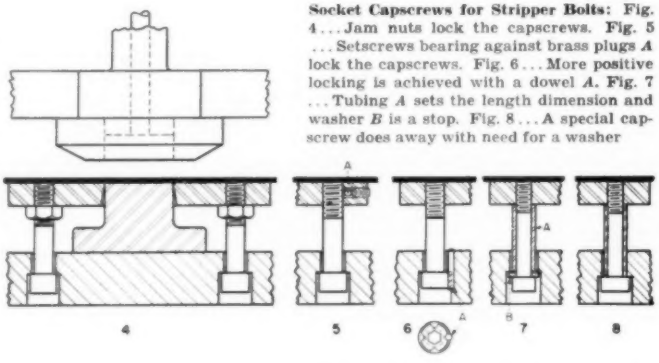
2. **Accessibility to the die.** Second-operation work can be easily located in the gages. In progressive dies, jams are cleared more quickly than with solid strippers.

3. **Greater accuracy.** Since the strip is held flat prior to the piercing operation, the location of holes and the distance between them are closely maintained. Solid strippers do not remove waves from the strip and, therefore, hole location is influenced.

4. **Cleaner fracture.** This is especially true while running thin stock. The pressure of the stripper plate prevents the "dishing" of hole edges, typical of this type of work.

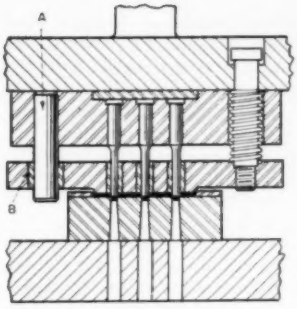
5. **Less wear and fracture** of slender piercing punches. Solid strippers allow the strip to lift a certain amount before stripping takes place. This pinches the punch on two sides, eventually wearing it to an elliptical shape. Since spring strippers strip the punch immediately, this extra wear does not occur.

Plates for spring strippers vary from $\frac{3}{8}$ to $1\frac{1}{2}$ in. in thickness, de-



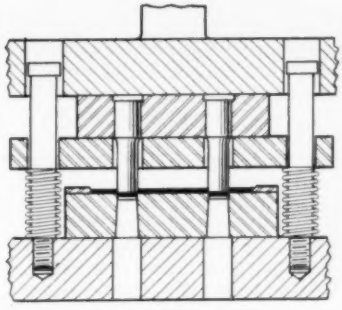
4 5 6 7 8

Socket Capscrews for Stripper Bolts: **Fig. 4**...Jam nuts lock the capscrews. **Fig. 5**...Setscrews bearing against brass plugs *A* lock the capscrews. **Fig. 6**...More positive locking is achieved with a dowel *A*. **Fig. 7**...Tubing *A* sets the length dimension and washer *B* is a stop. **Fig. 8**...A special capscrew does away with need for a washer



9

Fig. 9... Guide pins *A* operating in bushings *B* prevent rocking of the stripper plate and are essential when frail punches are required



10

Fig. 10... If the press does not have a knockout bar, use a spring stripper operated by long shoulder bolts

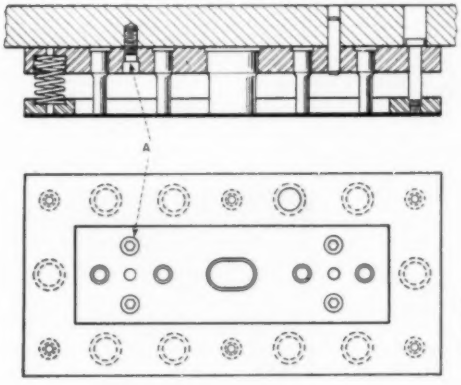


Fig. 11... Box strippers, applied to large dies, need not be dismantled for punch sharpening

pending on pressure requirements. Thickness is an arbitrary decision; no rules can be given because too many variables are involved.

It is wise to make all spring stripper parts as strong as possible. Do not be misled by the fact that, under normal operation, the stripper plate merely rides up and down without undue shock. All spring pressure plates stick at some time or other. When this happens, a pry bar must be used to release the plate, which slams up with the stored energy of all the springs. This tremendous shock will fracture inherently weak parts.

Fig. 1 illustrates an inverted blanking die, in which travel of the stripper plate is limited by shoulder bolts. This is a common application for light work. Considerable clearance must be allowed when boring and counterboring for the bolts. The body hole should be 1/32 in. greater than the bolt body for bolts up to ½ in. in dia and 1/16 in. over size for larger bolts. The counterbore for the bolt head should provide 1/16- to ⅛-in. clearance.

The stripper plate must be machined a loose fit over the upright punch, and is relieved to a 5° angle, as shown. It must be free to rock when uneven strips are run through, or burrs and chips get between the stripper and upper die. Otherwise, the binding pressure would probably snap off the bolts at the thread shoulder *B*.

Stronger construction is shown in Fig. 2. Here, the shoulder bolt body enters a counterbored hole in the plate. Depth of the counterbore is usually from ⅛ to 3/16 in., and the diameter fits the body of the bolt closely. For heavier work, this design is much better than the one shown in Fig. 1, but is more expensive.

In a conventional blanking die, Fig. 3, the stripper plate is attached to the upper punchholder. Washers *A* are placed around the shoulder bolts when the punch is sharpened, in order to maintain the relative position of the plate to the face of the punch.

In Fig. 4, socket-head capscrews are used to limit stripper plate travel. They are locked by jam nuts. This provides a strong, readily adjusted arrangement.

Socket capscrews are also employed in Fig. 5, in this case being locked by setscrews bearing against brass plugs *A*.

The locking arrangement illustrated in Fig. 6 is more positive than those previously shown. It consists of a dowel *A* pressed into the die holder of the die set, and bearing against one of the round, milled grooves machined in the screw head, as shown.

Fig. 7 shows another application of socket-head capscrews in limiting plate travel. In this case, a piece of tubing *A* sets the length dimension, and a washer *B* acts as a stop. This is a cheap and sturdy design for heavier work.

The special capscrew shown in Fig. 8 does away with the necessity of using a washer. Here again, the tubing sets the length of the assembled shoulder bolt.

Socket capscrews, employed in the ways shown, give greater strength than plain shoulder bolts, eliminating the weak point at the thread shoulder.

Guide Strippers

The rocking type of stripper plates described so far are not suitable for guiding slender punches. Fig. 9 illustrates a commonly used type of guide stripper. Two guide pins *A*, pressed into the punch plate, guide the stripper plate by means of hardened bushings *B*. Shoulder bolts are used in this application to limit plate travel and the work is located in a nest. Use of accurate guide pins in this manner provides an excellent means of supporting frail piercing punches,

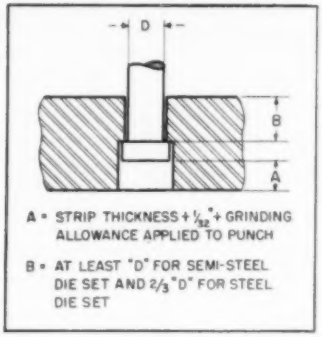


Fig. 12 . . . Proportions of shoulder bolt holes are important to successful operation of the die. Dimension *B* should be as large as possible for adequate strength of the assembly

and should be used whenever possible in high-grade press work.

Another type of spring stripper, Fig. 10, is used when the press is not equipped with a knockout bar, or when the nature of the work makes it impossible to apply a knockout plate to the die. In this type of stripper, the shoulder bolts are made as long as possible. In use, the part is stripped from the piercing punches high over the die. If the die is set in an inclined press, the part then drops to the back of the press and into a box.

Fig. 11 illustrates a box stripper applied to a large die. The stripper plate is open in the center and does not guide the punches, because they are sturdy and do not require support. The self-contained unit does not need to be taken apart for punch sharpening, but it is removed from the die by taking out bolts *A*. The punches can then be pressed out the back. Assembly of a considerable number of springs into a stripper is a difficult task. In large dies, strippers should be made as a unit, if possible.

Correct proportions of shoulder bolt holes are given in Fig. 12. Dimensions applied to the die should not be smaller than the minimum figures given. Dimension *B* should be made as great as possible. Otherwise, a few jams of the plate and subsequent prying loose could easily ruin the dieset.

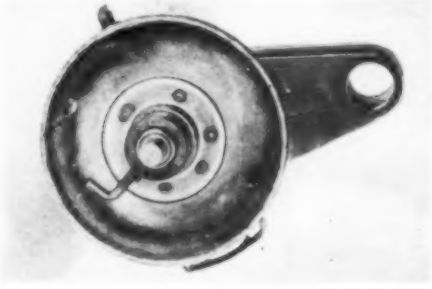
CARBON ARC WELDING SEALS GEAR CASE

BY FRED GANDERT, Welding Engineer, Mansfield Works, WESTINGHOUSE ELECTRIC CORP.

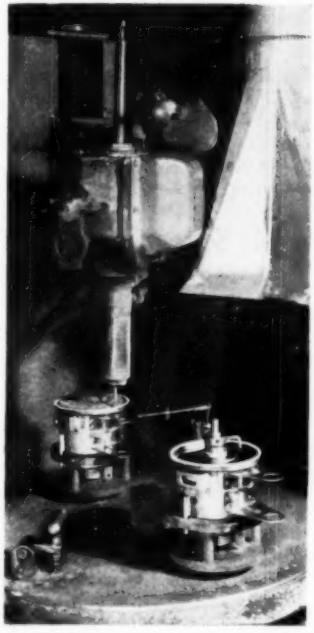
AUTOMATIC carbon arc welding of the joint between two 0.062-in. hot-rolled steel case members seals the assembled speed-change mechanism used in Westinghouse Laundromat domestic automatic washing machines. The main section of the case is a deep-drawn shell 6 in. deep and 5½ in. in dia. Cover is made of the same material with a ⅜-in. flange which fits closely inside the open end of the case. After all the mechanism has been assembled in the shell, the cover is pressed into place with an arbor press. A clamp collar held with a lockscrew keeps the cover in alignment until seam welding is completed. The surface to be welded is coated with a special flux which gives better arc stability and provides a more uniform weld bead.

Automatic welding machine developed by Westinghouse engineers for this operation has a two-position table which can be indexed to bring either of the two welding fixtures into position under the welding head carried on a slide on the machine column.

After loading a unit into one of the fixtures, the operator indexes the table and pushes a starting button to initiate the cycle. During this cycle, the fixture is automatically rotated under the ⅜-in. dia carbon rod.



Welded gear case containing gears and other units of washing machine speed changer is sealed by weld bead around periphery. Clamp ring and screw on the shaft extension serve to push cover into place until weld has been completed



Automatic carbon arc welding machine joins cover to case of Laundromat speed-change unit at rate of 50 ipm, using 32 v, 250 amp dc. Table carries two fixtures so one can be loaded while other is in use under the welding head

Indicating Gages Sort Mixed Parts

Equipment speeds matching of 50,000 paired units, mixed by subcontractor

BY JOHN J. MEADOWS, P.E.
Consulting Engineer

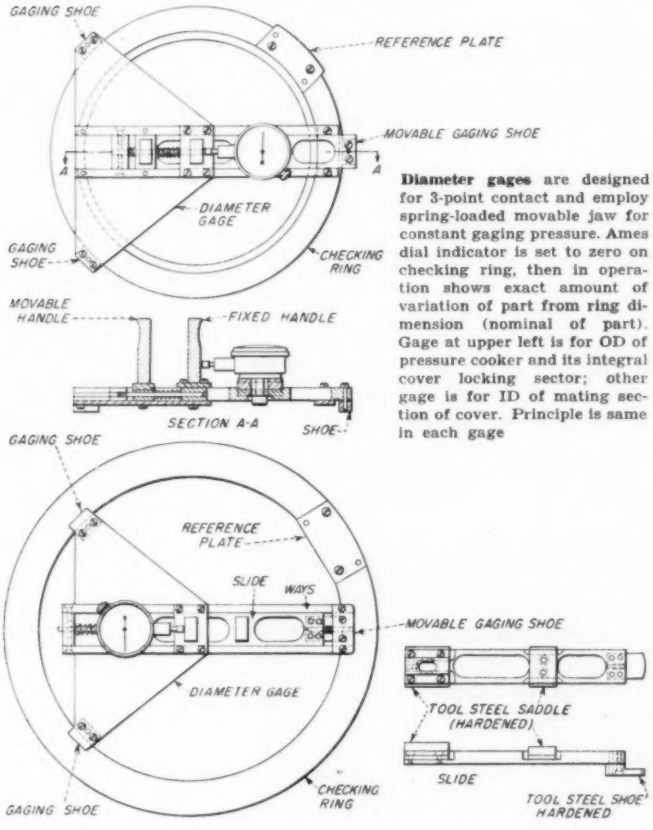
Two special gages saved a $500,000 investment when fitted pairs of pots and covers for pressure cookers became hopelessly mixed. When the condition first arose, scrambled parts required an average of ten fittings in assembly before two "mating" parts could be found. At the same time, the operation often resulted in poorly matched units. To overcome this situation, special gages were designed to permit orderly sorting of pots and covers into tolerance groups that enabled proper assembly.

One gage was designed for pots, a second for covers. Each was provided with a checking ring accurately ground to the diameter of its corresponding part. As the cookers employed a sector locking arrangement, each checking ring was also provided with a flat plate that projected beyond the checking circle and corresponded to the diameter of the lip that engaged the mating part.

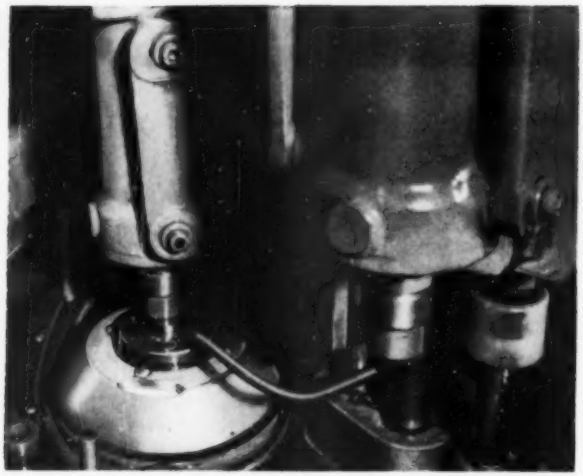
To provide equalized fitting when gaging, the gages were triangular. Two legs were fixed and were spaced to straddle one of the locking lips and yet permit rotation of the gage so another lip could be checked. The third leg was movable and was spring loaded so the same gaging pressure was always applied. The gaging surface was mounted on a slide supported in ways and arranged to move along an axis perpendicular to the line joining the centers of the fixed gaging surfaces on the other two legs. A compression spring was provided to keep the movable gaging surface in contact. Handles were also added, one mounted on the sliding gage member and the other on a bridging unit attached to the ways. By squeezing the handles together the sliding gage was withdrawn against the action of the spring and the whole gage unit could then be inserted in or removed from the element to be gaged.

The sliding gage member actuated the indicator gage, which was mounted on the slide. By inserting the gage into its checking ring the normal zero of the indicator could be set. Rotating the gage to the reference plate then gave a reading that represented the nominal dimension of the locking lip. With this setting on the gage, it was then possible to sort pots or covers according to known tolerance limits so proper fitting could be obtained on the assembly line.

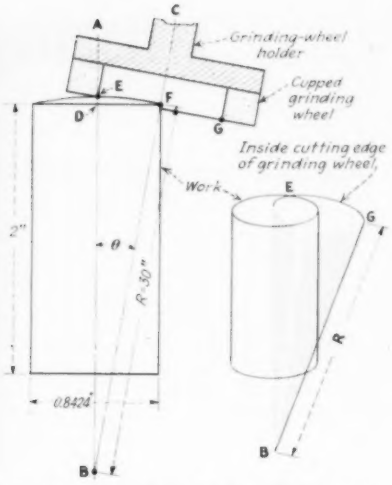
Total cost of the gages was $300. Although tolerances then were established and methods set up to permit interchangeable manufacture on future lots, the investment in gages was repaid many times over in speeding matching of the initial production of fitted parts.



Diameter gages are designed for 3-point contact and employ spring-loaded movable jaw for constant gaging pressure. Ames dial indicator is set to zero on checking ring, then in operation shows exact amount of variation of part from ring dimension (nominal of part). Gage at upper left is for OD of pressure cooker and its integral cover locking sector; other gage is for ID of mating section of cover. Principle is same in each gage



Tappet bodies for Oldsmobile hydraulic valves are chucked in Gisholt machine with nine spindles. Chucks are aligned straight up, but cupped-wheel spindles are slanted off by adjustment of vertical support link



Angled grinding-wheel holder holds cupped wheel at angle θ to vertical axis AB. Inside edge does all the cutting, touching at E and along arc over top surface of tappet body. Radius of 30 in. is thus lapped

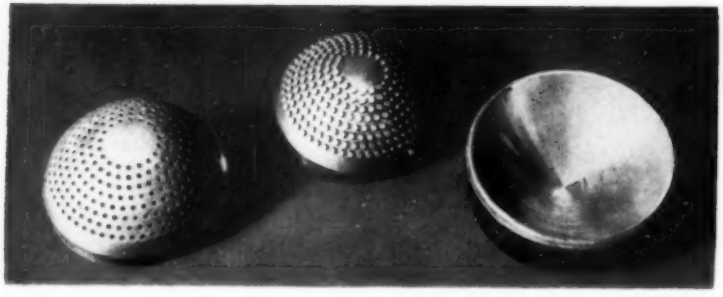
Two Methods Lap Small Curved Surfaces

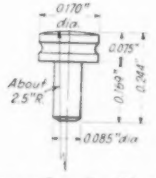
Diesel-injector valves and hydraulic-valve tappets for automobiles are both curve-lapped at Diesel Equipment Div., G M C, but size differences make it necessary to use two different methods

BY CHESTER S. RICKER,
DETROIT EDITOR

ONE METHOD of lap-finishing small parts is to chuck them in a nine-head Gisholt automatic. Valve tappets with 0.8424-in. diameters are finished by cupped wheels held at an angle to the axes of the parts.

The tappet rotates on the axis AB, while the cup rotates around BC. The inside edge of the cone is in plane EG, and can be considered the base of an inverted cone with side R 30 in. long. As in the sketch, a line along the side of the cone, EB, will fall on the axis of the part. The simplest setup is made with the ID of the cone exactly twice the length of chord EF. The head is then adjusted to the right angle θ, and the work is plunge-cut. This method is both

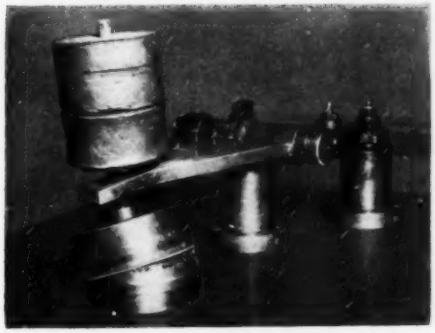




Injector valves for Diesel engines are cemented into holes in rounded holder—350 of them at one shot. Cast-iron (or lead) lap, at left, is machined to correct radius, about 2.5 in., with special care

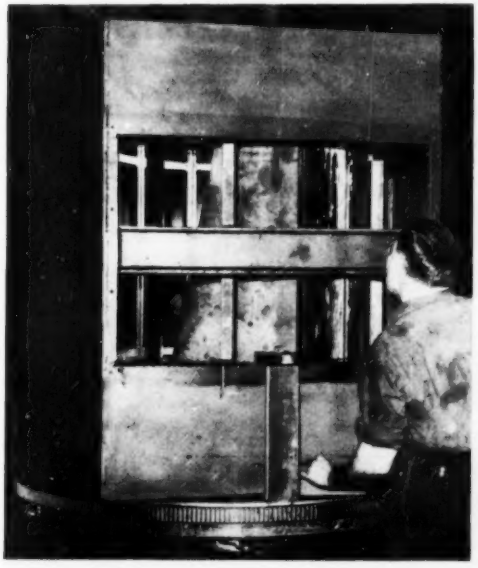
accurate and fast, and can be handled by women workers.

A second method of obtaining the same results, but on a smaller scale with 0.170-in.-dia valves, is to seat them in a rounded holder and oscillate the lap around them. Valve stems are inserted in holes in the holder and gripped by pyroxylin cement. The shop-built lapping machine carries a cast-iron concave lap for roughing passes, and a similar lead lap for finishing. Weights are mounted over the lap to provide a normal force. The stack can be increased to vary the weight. Crane arm swivels on main support spindle to slide lap surface over valves.



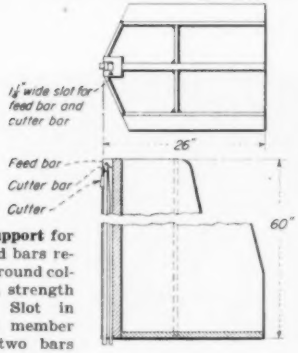
Rotating and oscillating lapholder is ball-jointed to connecting arm, which is weighted. Eccentric-mounted crank at right operates workholder arm about center support. Spring latch holds up arm for loading a new holder into position on the table

A vertical shaft through the table rotates an eccentric link, which drives the pivoted arm and rotates the lap. At the end of a run, the arm can be lifted and held up by a spring latch so a new holder can be mounted. Dunking the old holder in lacquer solvent releases the valves from the holder.



Motor frame rides on adapter ring (made special for each frame size) that fits in turned recess on ID of ring gear

MOTOR-FRAME SLOTTING HANDLED BY KEYSEATER

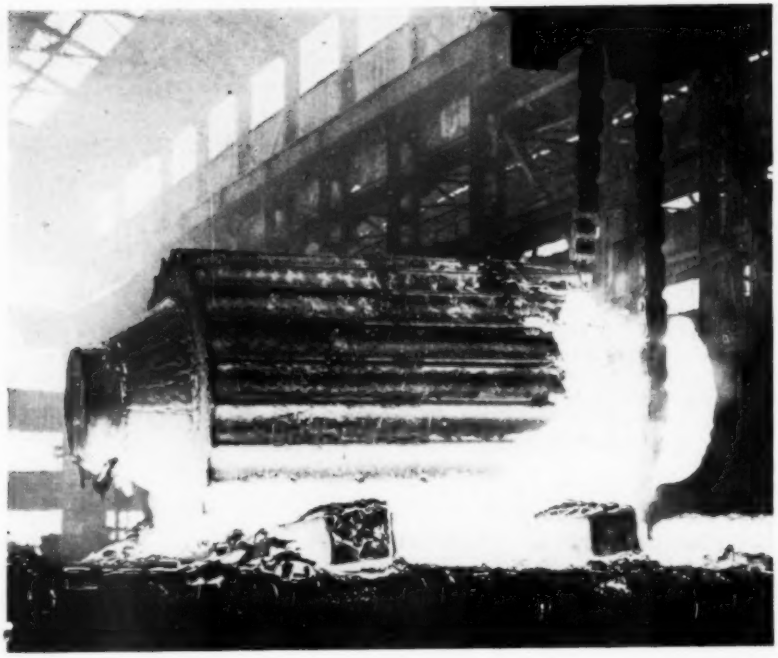


Box-column support for cutter and feed bars replaces normal round column for extra strength and rigidity. Slot in main vertical member confines the two bars and keeps them in line

BY HAROLD C. ANDREE,
Tool Engineer,
WESTINGHOUSE ELEC. CORP.

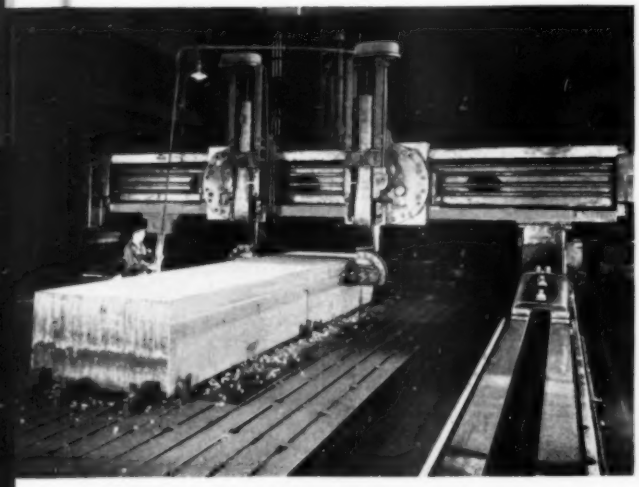
HEAVY-DUTY keyseating instead of conventional milling with a post machine was the operation decided upon at Westinghouse Electric, Sunnyvale, Cal., plant, when a limited quantity of large motor frames had to be slotted to receive stator laminations. A special box column was built to support and guide the cutter and feed bars for the long strokes that were necessary.

Hobbed teeth on a cast-iron ring gear located the machine table against an index plunger. There were 360 teeth in the gear so the work could be located rotationally on any position in increments of one degree of arc. A pinion operated by a rachet wrench rotated the big gear and the motor frames into position. The cutter and cutter bar worked in a vertical slot in the box column, to machine out the stator slots.

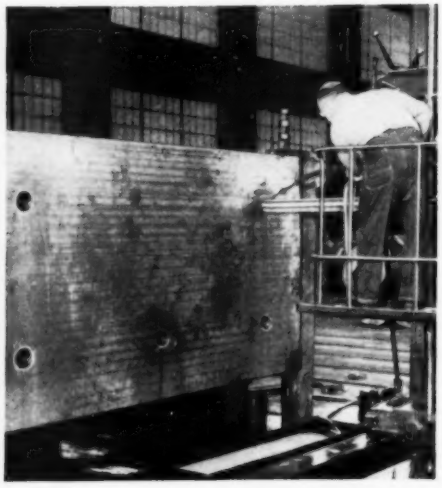


Rough 230-ton ingots of low-carbon, high-permeability steel were heated to over 2000 F in a car-bottom furnace before they were forged in a 7500-ton steam-hydraulic press

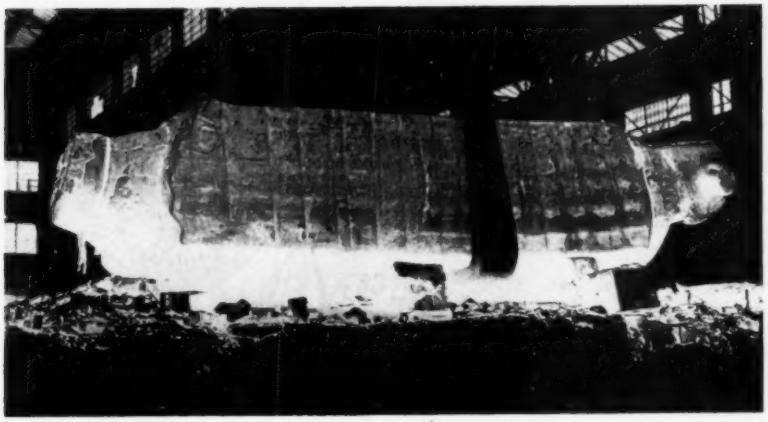
BIG TOOLS MACHINE MASSIVE CYCLOTRON



Final external machining was done on monster planer with twin heads on overarm that travels on two double ways. Finish on yoke members was not high and tolerances were wide

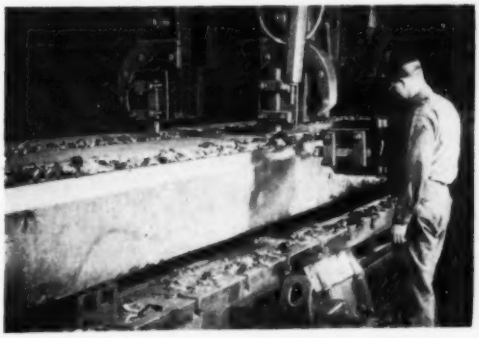


Holes for assembly bolts were bored on large drilling-and-boring machine. For all setups, clamping was easy because weight and mass of plates prevented much motion during machining

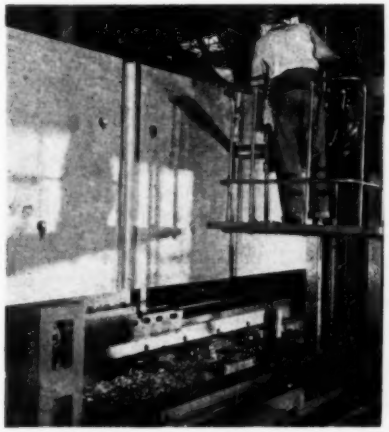


Reheating between several forging cycles was required because of ingot sizes. Forging press squared and worked the ingots down to plate size, which allowed two plates from one ingot

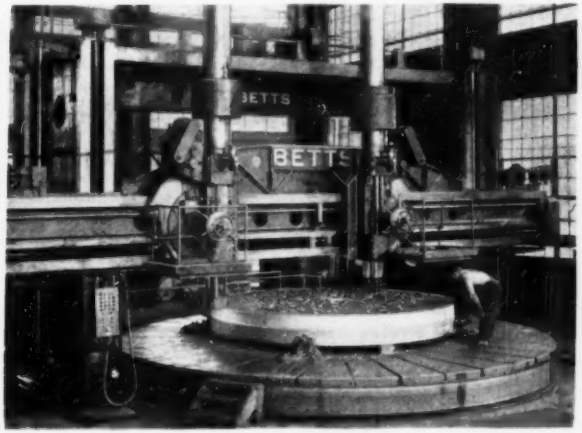
Columbia University's new cyclotron is expected to produce big things in the world of nuclear physics—and its construction called for big things in the Metalworking world. The yoke that holds the two 170-in. dia electromagnetic poles was built up from ten 60-ton plates on top and bottom, and five 38-ton plates on both sides. The finished assembly is 33 ft long and 21 ft high (see cover). To do the job, Bethlehem Steel's largest machine tools had to be operated under near-capacity loads



Oxide skin and excess metal was removed first with a large planer. Side plates were cut to 126 x 63 x 34 in. and top and bottom plates were machined to 396 x 63 x 33 in.



Largest yoke members were bored, then grooved on horizontal milling-and-boring machine for assembly location. Machines for forming operations are among the largest in the country



Circular plates that form pole pieces for the magnet were turned on outsize vertical boring mill to close dimensions and were fitted with shims to allow adjustments after assembly. Pole pieces are 170 in. in diameter

Where Are The Toolmakers?

"Toolmaking ain't what it used to be," says one shopowner, who seeks, but does not find, the all-around old-time mechanic for his shop

BY JOHN R. GODFREY

TOOLMAKING ain't what it used to be," complained the boss of a rather small shop which does a large variety of work. He often needs to have special tools made to make parts for his customers.

"Years ago," says he, "I'd take the pieces I wanted made to my toolmaker and, in a few days he'd have tools for the job laid on my desk. But not any more. Now he says, 'I'm no tool designer. Bring me drawings of the tool and I'll make it.' Then he gets insulted when I ask him why he calls himself a toolmaker. He's just a machinist who can work to half-thousandths—perhaps.

"So I go to a tool designer and find a guy who can make nice-looking drawings but whose real shop experience is less than that of a second-year apprentice in the old days. He spends a week and comes up with a drawing for a fixture that costs more to make than I'll get for the whole job. It would possibly work fine in a big shop with the latest machine equipment, if I had to make a million or so parts. The drawing is lousy with half-thousand tolerance on dowel-hole locations and other dimensions my so-called toolmaker would have trouble following, and he has a good average toolroom equipment at that.

"In my day, a toolmaker was the man who could look over a piece of work to be made and fudge up a tool that would make it accurately, in good time, and using the machine equipment available. In other words, he was long on machine sense that fitted into our needs. He could split thousandths where it was necessary, but he didn't waste time on close tolerance where it didn't count. He might polish the heads of the jig bushings so the drillpress man would have a little respect for the tool, but he didn't polish the body of the jig just to make it look fancy.

"I have no quarrel with tool designers when they are needed and when they know their job. They can and do lay out fixtures and jigs for a series of operations that might stump even a first-class toolmaker in a small shop. But too many of them do not have more than a speaking acquaintance with the methods used in the small or average shop. They visualize every shop or toolroom as having a bunch of jig-borers so it is easy to locate dowel-pin holes in exact locations, whether they need be accurately spaced or not. I'm all for jig borers, have a good one myself, but that doesn't give my so-called toolmaker any ideas as to laying out a jig or other tool to make it possible to get out a small lot of parts in a hurry, and with a small profit left.

"I'm wondering if this ties up at all with the recent AMERICAN MACHINIST survey of colleges which have dropped their shop courses. I don't expect to hire a college man as a toolmaker and have him satisfied to fudge up small special tools all his life. But at present toolmakers' pay, he might do worse.

"I used to know a number of the trade schools such as the one in Worcester where my old friend, E. H. Fish, taught the young ideas how to shoot. The bright boys had a chance to learn the *why* of machine work as well as how to run a lathe, chase threads, etc. Some of these boys made real toolmakers, who not only worked to close limits but had the ingenuity to work out and build special tools that didn't break the bank, but did turn out more work at less cost.

"Tool engineers could take a leaf from the old Franklin automobile shop in Syracuse, which built high-grade cars at a low cost. Their tool designers had to get the okay of the shop foreman who was to use the tools, before the design was approved. This worked two ways. It prevented the foreman from grouching about the fixture when it got to his department and blaming it for slow production. For after he had okayed the design with his initial he had to make it work or admit he didn't know a poor design when he saw it."

I believe there is a real field for real toolmakers of the old type. They will not replace the tool engineers, who belong in a higher field. But many of these tool engineers can study some of the old jigs and fixtures to advantage. Many were crude but they fitted the work to be done and the tools on which they had to be used. They cost little to make, even at today's wages.

Young men who will study ways and means of making tools that cost little and increase production will always be in demand.

How Modern Mechanical PRESSES Operate

BY SERGIUS D. BROOTZKOOS

TO SELECT, use and repair a press properly, one should know how the various kinds of presses function, the different kinds of mechanisms employed in their construction and the relative maintenance problems. Mr. Brootzkoos, from long experience in the press industry and in writing on presses and dies, brings to you a comprehensive analysis of mechanical presses, and the kinds of work which they handle

Table 1 . . . CLASSIFICATION AND CONSTRUCTION OF MECHANICAL POWER PRESSES

TYPE	SINGLE ACTION (Single working slide) / DOUBLE ACTION (Two working slides: one inside the other) / TRIPLE ACTION (Double-action press above, single-action below bed)
MATERIAL	CAST IRON, CAST STEEL, WELDED STEEL
FRAMES	GAP OR OVERHANGING: OPEN BACK — Vertical, Inclinable, Inclined; SOLID BACK — Curved Beam — "C", Straight Column — Fixed table / Adjustable table; Horning type — Vertical, Horizontal; STRAIGHT-SIDE, DOUBLE COLUMN — One-piece cast, Four-piece, bolted, Four-piece, tierod assembled — Vertical, Inclined, Horizontal
SLIDE AND ACTUATION	CRANKSHAFT — Side Wheel Drive / End Wheel Drive / Plunger / Blankholder; Crankpin — Eccentric — Semi-eccentric / Pin-eccentric; Crankpins: three-throw type — Crankpin / Cam — Crankpin / Toggles; PIN; Eccentric(s) on main (bull) gears; STROKE; SLIDE — One, two or four-point suspension; PRESS CONNECTION — Adjustable-length pitman; One-piece pitman; non-adjustable, seat adjustable; Knuckle Joint
DRIVE	FLYWHEEL — Geared: Single and Twin
CLUTCHES	SLIDING PIN, ROLLING KEY, SLIDING KEY; JAW FRICTION: MULTIPLE DISK, DRUM AND TUBE; ELECTRO-MAGNETIC; "SAFETY" CLUTCH ATTACHMENTS; BRAKES

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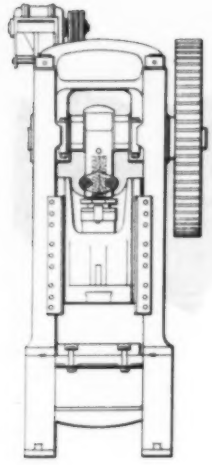

Fig. 1 . . Single-action presses are used in great numbers. This type is of the straight-side variety with tierod frame construction, and is single geared

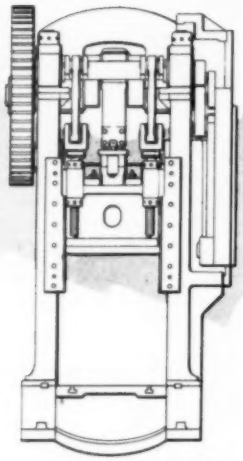

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Fig. 2 . . In double-acting toggle drawing presses, the outer slide holds the blank, cup or shell while the inner slide forces the metal into the die

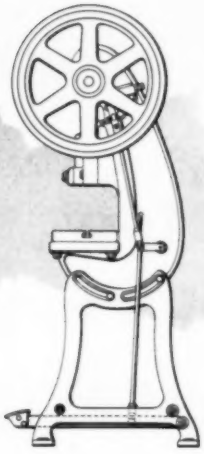


Fig. 3 . . Inclinable open-back presses are the most popular type and are now built in capacities up to 250 tons. They are inclinable 30° to 40° from vertical

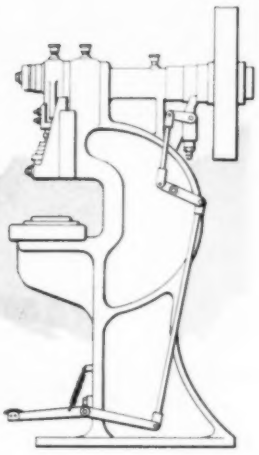


Fig. 4 . . Oldest type of press in use, the curved-beam, C-frame solid-back press, is commonly called a "Punching press, end-wheel drive type"

Types of Mechanical Presses

EXTENSIVE use of mechanical power presses by industry started with the advent of electrical home appliances and the automobile. These products brought a revolution in the use of metals, in the art of rolling them and in the design of various end-products. Nevertheless, there is a noticeable lack of knowledge among many people connected with industry about presses, their construction, design, pressure capacities and methods of selecting presses for work at hand.

Table I lists in condensed form the salient points in construction of mechanical power presses. The first column specifies the subjects covered in this report. The other columns are reserved for two distinctive types of mechanical power presses now in use—namely, single-action and double-action presses. Wherever the subject discussed is related to both types of presses, it is listed midway between the columns. When the subject is related to only one type of press, it is listed in the proper column only.

All mechanical power presses are either of the single-, double- or triple-action types.

Single-action presses have only one working slide or ram, Fig. 1. This slide moves towards the press table to perform the work. After each stroke, the slide returns to its starting position and usually stops there unless the press is equipped with an automatic feeding device for continuous operation.

Single-action presses are used for the most diversified applications: bending, blanking, coining, embossing, forming, piercing, shearing, sizing, stamping, trimming, etc. These presses, when equipped with rubber buffers, spring-pressure attachments, or pneumatic or hydraulic die cushions in the table, are also used for drawing seamless hollow articles.

Double-action presses have two slides that work one inside the other (see Fig. 2). The outer slide has a dwell period; that is, it stands still at its lowest position while the inner slide, which lags behind, passes through its lower dead point. After this, both slides return to their starting positions.

Double-action presses were developed especially for drawing seamless hollow articles. The outer slide, known as the "blank-holder slide," is equipped with a suitably shaped punch to hold the flat blank or previously drawn cup or shell to the face of the lower die during the dwell period. While this is done, the drawing punch, attached to the inner, or "drawing" or "plunger" slide, forces the metal through the die into a new shape. This arrangement of slides prevents formation of wrinkles or folds in the walls and flanges of drawn articles.

Triple-action presses are in reality double-action presses with an inverted single-action press either incorporated in or attached to the bed of the press. Timing of the lower slide movement is arranged either through a link mechanism connected to the upper press or by the use of an electrically or cam controlled clutch in the drive of the lower press. Triple-action presses have limited use.

Materials Used in Presses

MECHANICAL POWER presses are built of cast iron, cast steel and of welded steel plates. All of these materials have their advantages and disadvantages.

Cast-iron presses, as a rule, are "beefier" and heavier than cast-steel presses of identical design and pressure capacity. The latter are in the same position in comparison with presses made of weld-steel plates. Steel presses may, therefore, be used on the upper floor of the plants where building codes do not permit the installation of heavier machines. The casting of steel presses is more costly than casting of cast-iron presses.

Cast-frame presses are built in designs, dimensions and shapes for which a sustained demand exists or is anticipated. Welded-steel presses are often "tailor made" to requirements of individual users. Hence, the building cost of welded-steel presses may be high. However, such machines often are the only answer when extremely powerful presses with broad, wide and deep beds and crowns and with high die spaces are required. Relatively light weight of these presses permits their transportation by rail or steamer, and also installation without making the beds and crowns of split and bolted cast parts.

Cast iron is preferred in high-speed presses because of its high dampening qualities. Its use in presses also provides a safety factor. Under severe overload, a cast-iron press frame breaks, whereas a steel frame may spring and remain in that state, leading to increased wear and tear of dies unless the misalignment is noticed.

In general, users should be more interested in sturdiness of presses with guaranteed minimum spring under rated load than the material used in press construction. Die cost is often higher than press cost. Wear and tear of the dies caused by excessive springiness of the press frame may upset all previous production-cost calculations.

Press Frames

MECHANICAL POWER presses are built with gap (overhanging or "C") frames or with straight-side, double - column (stand) frames.

The frame construction in gap (overhanging or C) frame presses is of either open back or solid back.

Open-back gap-frame presses have two C-shaped stands. These are connected at the gap bottom by a heavily ribbed table and at the middle and top or crown by tieplates. These reinforcements assure rigidity and maintenance of relative positions in service.

Open-back gap-frame presses are either mounted in a fixed position (vertical, horizontal or inclined) or arranged to permit inclining the press frame about 30° to 40° from the vertical. The latter type are called "open back inclinable presses" or briefly "OBI Presses," (see Fig. 3) and are the most popular type in use.

Open-back gap-frame presses allow complete freedom in selecting and attaching automatic feeding devices, because the die is accessible from all four sides. The inclined or inclinable types are advantageous where the stamped article remains on or is lifted to the top of the die and can slide by gravity or be blown into a tote box. This feature eliminates the major cause of accidents, because operators do not need to place their hands between the punch and die.

Open - back gap - frame presses are built in single- and double-action types and are used for diversified operations.

Vertical and horizontal open-back gap-frame presses with long strokes of the slides are much used for redrawing (reducing) work in manufacture of cartridges, lipstick holders, radiators, etc.

All open-back gap-frame presses are of the side-wheel type of drive, where the flywheel or the main gear is located at the right-hand side of the press frame.

Solid-back gap-frame presses have either curved-beam "C" or straight-column frames and are built exclusively in the single-action type. Curved-beam presses (Fig. 4) have frames of T-shape cross-section and the crankshafts are placed front to back, so that the drive (flywheel or main gear) is located in back of the press frame. This construction permits use of these presses on the inside of wide work, say up to double the width of the gap.

Upper parts of straight-column, solid-back presses are built to the same shape and design as curved-beam presses, but from the gap to the pedestal their lower parts are of a straight-column design. The column is therefore of a channel, T- or even a box section, and the drive is either of the side or end-wheel type.

Use of Tables

Solid-back gap-frame presses are built with or without tables. In the latter case the table is often cast separately and then bolted to the machined front of the press column. Presses with tables cast integrally with the press column may be used for all single-action type work. Machines with bolted tables may be used for similar work except where close-fitted dies are involved.

Presses with screw-adjustable, swinging and bolted tables are used primarily for bending, riveting, side seaming, u-ing, and for curling and wiring top edges in cans, pots, pans and other vessels. These presses are therefore called "adjustable-bed horning and wiring presses."

Straight - column, solid - back presses without a table but with a horn held in the column of the press are called "horning presses" and are used for piercing and riveting work.

In all solid-back gap-frame presses, the die is accessible for feeding by hand or by automatic feeding devices from three sides only (right, left and front).

When considering the use of gap-frame presses, it must be remembered that they spring under working load and that this spring is in a radial direction. Thus, their selection is not advisable for work with dies having extremely close-fitted cutting edges, such as compound, shaving, lamination, and perforat-

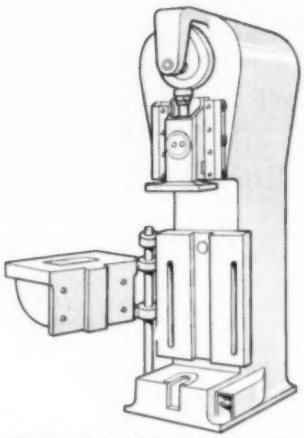


Fig. 5.. Adjustable, swinging tables, as shown on a horning and wiring press of the end-wheel-drive type, are positioned to suit die height and swung aside when special die supports or horns are attached to the press column

ing tools, unless an oversize press or a die set with large-diameter guide pins is used.

To reduce radial spring, gap-frame presses are sometimes provided with tierods between the crown and the table. But without pipe spacers that assure an exact distance between crown and table, the use of tierods may be harmful. For without spacers, the tierods may be overtightened and die alignment suffers.

Straight-Side, Double-Column Presses

Straight - side, double - column frames are used in presses of the single-, double- and triple-action types for medium to heavy work of the most diversified character and pressure requirements. Resistance of the work and the resultant spring in the frames of these presses, being directed vertically, are easily taken care of by proper design and construction.

Frames for straight-side presses are made either of one-piece cast or of four-piece construction bolted together or held by four shrunk-in tierods.

Solid cast-iron frames are used in single- and double-action presses of low pressure capacity and especially in presses to be fitted with dies having closely fitted cutting edges.

One-piece cast-steel frames find greatest use in forging presses built with extremely heavy frames, and with narrow widths.

One-piece welded-steel frames find use whenever specially shaped frames are required and where one-piece cast-steel presses would exceed the carrying and lifting facilities of common carriers.

In four - piece, bolted - frame presses the crown, two stands or uprights and the bed are held together by plain bolts. This type of frame is still used in narrow (front to back) press brakes, squaring shears and in wide (right to left) gap presses.

The majority of modern straight-side presses are built of four-piece tierod construction. The crown, both uprights (columns) and the bed are held together by four tierods shrunk in place. These tierods take care of all tension stresses in the press frame during operation.

Construction of Uprights

The uprights (columns) in straight-side presses serve as supports for the crown and also as elastic and compressive distance pieces between the crown and the bed. Press uprights serve also as posts for attaching gibs that guide the slide as well as support it against side thrusts created by the work. Uprights are usually made with an oblong opening at the bed end to permit feeding coil stock across the top of the bed.

Beds in straight-side presses are of two-beam construction with cross ties to prevent buckling under heavy loads. In cast-iron presses these beams are made with a parabolic bottom shape for uniform strength. In welded-steel-plate presses, the beams are made of uniform height for easier welding.

Cross ties in press beds are spaced to leave an opening or openings for the stamped or drawn articles to be pushed through and for placing spring, rubber, air or hydraulic cushions. Depending on the width (right to left) of the press bed, one or more bed openings may be provided. Many presses, however, are built without a bed opening but with an air or hydraulic die cushion incorporated in the bed.

The press beds are usually covered by thick cast-iron bolster plates with tapped holes or T-slots for die bolts or fastenings. These plates are often made with cored holes over bed openings.

Careful attention must be paid to proper keying of all component parts in tierod press frames to assure proper alignment during assembly at the user's plant and to take care of sidewise thrust that may occur during press work.

Four-piece tierod press frame construction is particularly suitable for presses of single-, double- and triple-action types of any pressure capacity, of any width (right to left) between uprights, of any depth (front to back) of the bed, for any stroke, and any height of the die space.

Straight-side presses are mounted upright as a rule. Single-action presses of this type are sometimes mounted on inclined legs or horizontally for convenience in feeding, in order to speed output.

Straight-side, single-action presses are sometimes equipped with a bracketed-type extension of the table and an additional slide outside of one of the uprights. The second slide is actuated by a pin-eccentric on an extension of the main crankshaft. These "trimming presses" are used extensively in forge shops. The outside slide and its table are equipped with shear blades for severing the forging from the original bar after it is trimmed in the press.

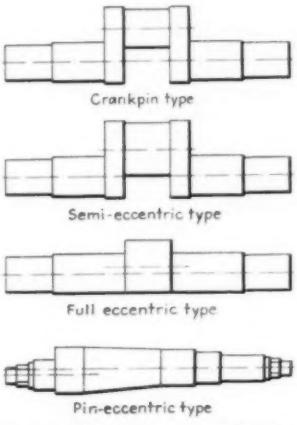


Fig. 6.. Four types of crankshafts used in presses

Press Slides and Actuation

IN ALL power presses the work is performed by the slide or slides through reciprocating motion to and from the press table.

In mechanical power presses, slide motion is derived from: (1) crankshafts incorporating crankpins or eccentrics; (2) eccentrics cast integrally with or bolted to rotating main (bull) gears; (3) eccentrics keyed to rotating shafts; (4) a pair of knuckles folded and straightened out by a pitman-crankpin mechanism and (5) oscillating rockershafts and toggles.

Single-Action Presses

In all single-action presses of the side-wheel-drive type, the crankshafts are of crankpin, semi-eccentric or full-eccentric designs (see Fig. 6). For work requiring a long slide stroke, double-cheek crankpins are used. In general stamping work, where a medium-length stroke is needed, choose the semi-eccentric type. Heavy embossing, sizing and forging requires a relatively short stroke as provided by a full eccentric.

The terms "short," "medium" and "long" as applied to slide stroke are relative and depend upon the diameter of the crankshaft at the main bearings. For example, a 7-in. stroke would be short for a press with 10-in. crankshaft, medium for an 8-in. crankshaft press, and long for a 4-in. crankshaft machine.

In gear-eccentric presses the slide is actuated by an eccentric or eccentrics cast integrally with or keyed and bolted to the main gears (see Fig. 7). These gears rotate freely on stationary pins fixed in the press crown. When eccentrics are combined with bull gears, it is necessary to place the whole slide-actuating mechanism inside the press crown right over the slide, and to locate it front to back.

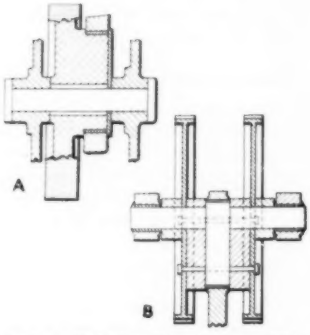


Fig. 7.. Slide actuation in gear-eccentric presses is accomplished by two designs: *A*—an eccentric cast integrally with the bull gear, or *B*—an eccentric bolted to bull gears

Placement of pins and crankshafts in front-to-back position is advantageous in wide (right to left) presses, because it eliminates the use of a long crank, intermediate and driveshafts. Each of these may twist and let the slide tilt under uneven working loads.

In one type of streamlined press the bottom of the crown is closed and filled with lubricating oil, in which all working parts of the driving mechanism are submerged. This is made possible by placing a sliding cylindrical plunger in the bottom of the press crown. The press pitman in these presses is attached to the upper part of the plunger (inside the crown), while the slide-adjusting screw is at the lower or outside part.

In end-wheel-drive presses, the slide is actuated by crankshafts of the double-cheek crankpin, keyed-eccentric or pin-eccentric types.

Crankshaft Support

The overhanging, or slide, end of the shaft in all crankpin and in many keyed-eccentric types of endwheel presses is supported by a gooseneck bearing cast integrally with the press frame (see Fig. 5) or bolted to it. This construction assures better support of the shaft against bending under working loads. For the same reason, the shaft end in the keyed-eccentric type presses is made with increased diameter, and in pin-eccentric presses, the slide end of the shaft is made large enough to include the slide-actuating pin Fig. 6.

Most recent developments in press design are: in (1) gear-eccentrics are placed inside the press uprights, and (2) the whole slide-actuating mechanism is mounted on the top of the slide.

In the first case, the development reduced press headroom.

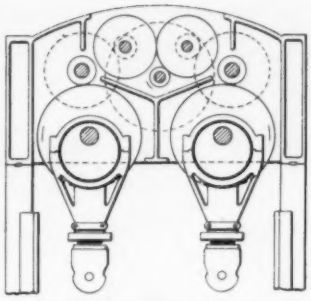


Fig. 8.. In wide presses with streamlined upper works, triple gearing is required to span the distances involved

However, in wide presses, long shafts were made necessary, and these are subject to heavy torsional stresses. Hence, with unequalized working loads, tilting of the slide may occur.

In the second case, where the whole actuating mechanism is mounted on the top of the slide, (see Fig. 9) of wide presses, reciprocating movement is effected by two or four eccentrics cast integrally with bull gears at right and left ends of the slide. These eccentrics are inclosed in yoke-type pitmans. Lower ends of the pitmans are hinge connected to large-diameter adjusting screws. These screws are held in the press bed but their position is adjustable vertically.

In this press, tierods are eliminated, because all tension stresses during press work are taken up by the pitmans, and the adjusting screws with their hinges. The crown of the press serves only as a spacer between the uprights. The slide can be removed from the press as a unit for inspection and repair, and the maintenance crew does not need to climp atop the press and inside the crown for any adjustment or repair work. Also less headroom is required.

To single-action presses belong the percussion type which is popular abroad but less so in this country. In these presses, the slide is suspended from and actuated by a vertical screw. This screw is threaded through a nut held fast in the crown, and the outer end carries a flywheel. Two large friction disks are mounted on a common horizontal shaft, each facing the flywheel. One disk is spring- or

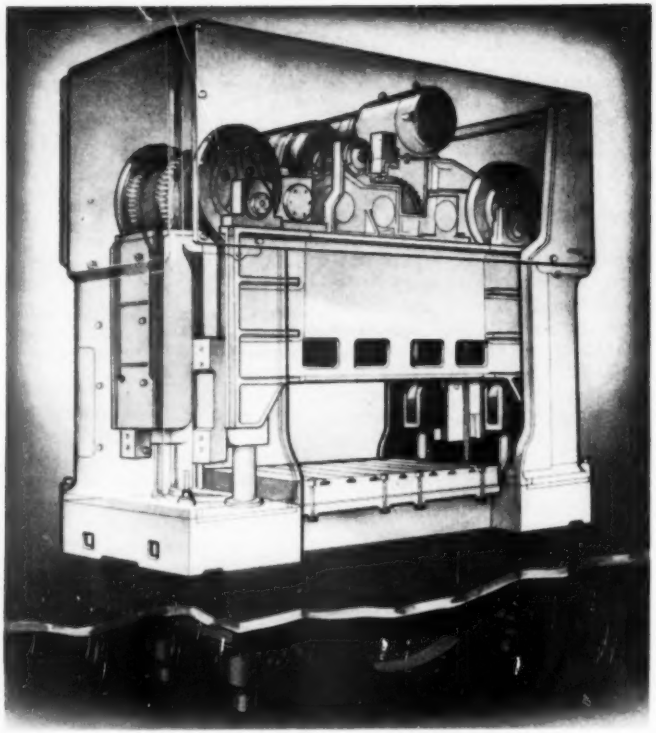


Fig. 9.. Tierods are not required in this four-point, single-action press, because tension stresses are absorbed by the pitmans and adjusting screws

air-piston loaded so that it is constantly held against the flywheel with enough friction to lift and keep the slide in its uppermost position. By depressing a treadle or air-valve control, the operator brings the other friction disk against the flywheel, while relieving the first one. This action forces the flywheel to rotate in the opposite direction and to lower the slide with an accelerating speed and an increasing force. Percussion presses are used for precision hot and cold forging work and for embossing work whenever flatness or the design requires a sharp blow.

Double-Action Presses

In double-action presses the operation of the inner or drawing slide and of the outer or blankholder slide is derived from the press crankshaft or the gear-eccentrics. Crankshafts used in these presses are of single- or three-throw types.

With a three-throw crankshaft, the central crankpin operates the drawing slide, and the two outer pins operate the blankholder slide. Limitations in size of the throws and in their relative angular position for insuring a proper dwell period of the blankholder slide, restrict presses so equipped to cutting and drawing of very shallow articles like buttons, watch rims, cartridge cups, medallion frames, and similar items.

With a single-throw crankshaft, the drawing slide is operated by the crankpin, whereas the blankholder slide with its dwell period is operated by two cams or by oscillating toggles. Hence, the names: cam drawing presses and toggle drawing presses.

In cam drawing presses, the crankpin cheeks are made with a cam contour or have cams keyed to them. In light gap-frame presses, lifting of the blankholder slide is accomplished either by two rods passed through the press crown and loaded by compression springs or by a back lever actuated by a cam mounted on the outer end of the crankshaft. In heavy gap-frame and in all straight-side presses, lifting of the blankholder slide is accomplished by inclosing the dwell cams in two cradled yokes attached to the blankholder slide. Thus, the cams lift and lower the blankholder slide.

In toggle-drawing presses both slides are operated by the crankshaft or crankshafts, or gear-eccentrics: the drawing slide directly and the blankholder slide through a toggle-link mechanism, which insures its proper timing and dwell (see Fig. 10).

Toggle Location

In light toggle-drawing presses the rockershafts and toggles oscillate in the front-to-back plane (see Figs. 2 and 10). In heavy and wide toggle-drawing presses, the tendency is to have them oscillate in the right-to-left plane. This development permits streamlining of the frames and eliminates protruding rocker shafts and toggle links.

It is important that the blankholder slide remain stationary and not vibrate in its lowest position during the drawing period of the inner slide.

The stroke of the slide in single-action presses (except in knuckle-joint presses) is equal to twice the throw of the crankpin or the eccentricity in the eccentrics. The same conditions apply to the stroke of the drawing slide in double-action presses, but the stroke of the blankholder slide is determined by its drive design.

Press Slides

Press slides are the most unbalanced parts in presses. Their action may, therefore, affect both the work and the life of the whole driving mechanism of the press.

In medium, in large and in all high-speed presses, the slide is usually counterbalanced to take care of its own weight as well as the variable weights of punches that will be used. Springs or compressed-air cylinders are generally used for this purpose.

Shape and design of the slide depend on press construction and the

degree of guidance desired. Ways should be as long as the slide and press frame construction permit. If possible, the slide ways should remain within the press gibs on the downstroke to assure guidance of the slide and longer life of the dies, especially those with close-fitted cutting edges. This condition limits the width of punches to the distance between the press gibs, whenever the slide enters the gibs on its up stroke.

Design of Gibs

Gibs in small presses are usually detachable, rectangular slabs with V-grooves. These slabs are set into recesses in the frame as at top, Fig. 11. Most presses, however, are built with flat-face rear gibs cast with the frame of the uprights. Front gibs in these presses are of a wedge type, and are both removable and adjustable in depth to permit assembling the slide in the press and bring it square against the fixed rear gibs. Working surfaces of the fixed rear gibs are often lined with phosphor-bronze strips to reduce friction between the slide ways and gibs, as at the two center views Fig. 11.

In presses intended for precision work with progressive piercing and blanking dies, it is advisable to have the slide built with square ways. The press frame should have adjustable left and right side gibs, Fig. 11, bottom, in addition to fixed back and adjustable front gibs.

Pressure of the slide, due to the angular action of press connections, should be directed during the down stroke towards the fixed gibs or pads; never against detachable or adjustable gibs. Application of pressure by the pitman should be on the centerline of the slide ways. This, together with the use of long slide ways, properly fitted to long gibs, avoids tilting the slide under the oscillating action of the pitman.

The above condition is usually absent in inclinable, punching and other gap-frame presses. But in these presses it is important that the leverage, that is, the distance between the centerline of the pitman seat and the centerline of the slide ways and the press gibs, should be as small as possible.

Single-action presses are built with one, two or four connections (pitmans) between slide and drive.

Presses with a single crankshaft running right to left, and having one or two crankpins, are called single- or double-crank presses, respectively. Presses with two parallel crankshafts each with two crankpins are called four-crank presses.

Presses with crankshafts and with stationary mainshafts (pins) running front to back are called one-, two- or four-point suspension presses, depending upon the number of crankpins and gear eccentrics in the drive mechanism.

Designation of presses as single-, two- and four-point suspension presses is becoming more common, because in streamlined presses the drive mechanism is completely covered up and it is impossible to tell at sight whether stationary pins or crankshafts are used.

The single-point suspension or single-crank arrangement is used in presses with relatively narrow widths between uprights.

Two-point suspension or double-crank presses have connections at each end of the centerline of the press slide. These presses are intended for work on long but relatively narrow articles.

Four-point suspension or four-crank presses have four connections, one at each corner of the slide. These presses are advantageous for work on wide (right to left) and broad (front to back) articles, especially when the working loads are distributed unsymmetrically.

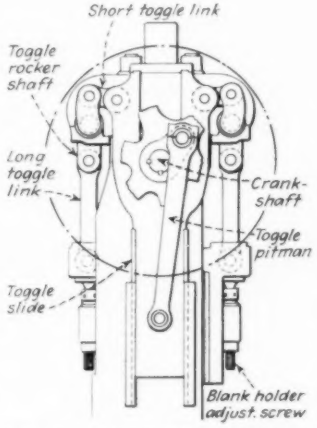


Fig. 10.. Slide-actuating mechanism of toggle-drawing press of the straight-side pattern

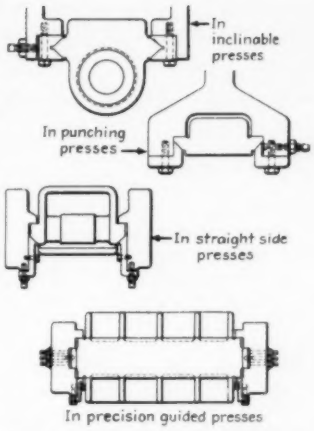


Fig. 11.. Slide ways and gibs bear on selection of a press. Types are: *top*—detachable gibs for inclinable presses; *center*—gibs for punch presses and straight-side presses; *bottom*—adjustable side gibs for presses

In double-action presses, the inner or drawing slide is built with one-, two- or four-suspension points for the same reasons as in single-action presses. The outer slide or blankholder in three-throw crank and cam drawing presses has two suspension points, whereas all toggle drawing presses are of the four-point suspension type.

Press Connections

Press connections perform dual functions in presses. First, they transform rotating motion of crankpins or eccentrics and the oscillating motion of rockershafts and toggles into reciprocating movement of the slide. Second, they serve as means for adjusting the position of the slide over the press bed at the end of its down stroke, in order to permit the use of dies with various shut heights.

The first function is achieved by making connections as pitmans or incorporating pitmans in them. The second function is obtained by making pitmans adjustable in length or, when these connections have one-piece pitmans, by having the pitman seat adjustable in the slide.

Press connections with adjustable-length pitmans are made in two or three parts interconnected

by a large diameter screw. The screw permits adjusting the press connection to suit the shut height of the die.

In screw-type, adjustable press connections the upper part is a strap with a split or a solid bearing fitted on the crankpin or eccentric. The lower end of the strap has an internal thread to suit the adjusting screw. The current tendency is to make the lower end of the strap as a solid shape with one- or two-piece clamping plugs or keys.

Many straps are still made with removable caps or with slots in their lower ends which can be tightened for clamping the adjusting screw in position.

Solid one-piece straps are preferable because there is less danger of breakage or of injury to the operator in case the die setter forgets to tighten the clamping bolts or studs. Straps with slots running from front to back are stronger and less likely to break than straps with slots running right to left or straps with removable caps. They are also safer in case of breakage, because the broken pieces will fly sideways and not towards the operator.

The shape of the adjusting screw depends upon whether the press connection is attached to the press slide by a ball and socket joint or wristpin (see Fig. 12).

Ball and socket press connection consists of two parts—the strap and the adjusting screw. The screw is made with a ball end which fits into a socket in the press slide. Such connections are used in light single- and double-action presses requiring a short adjustment of the slide. A disadvantage is that with each turn of the adjusting screw, the position of the ball in its slide socket is changed. Hence, since neither the ball nor the socket are made absolutely true, time is needed for them to work in.

The ball and socket arrangement does not counteract tilting of the slide under uneven working loads.

Screw-adjustable press connections of the wrist-pin type have three component parts: the strap of the types just described, the adjusting screw and the wrist.

The adjusting screw is made either with a collar near its lower end or a flange at the bottom. The collar or the flange fits into a bored seat in the upper part of the wrist body and is held there by a threaded ring or a sleeve bolted to the wrist body.

The wrist body is a one-piece casting with the bottom face cylindrical in shape to fit into a seat in the press slide. The wrist body and the slide are pin connected. Pin hole in the wrist body is of an oblong shape to assure proper transmission of the pressure to the slide without any load on the connecting pin.

Press connections that permit long adjustment of the slide have a solid, one-piece pitman with a wrist end to which a wrist seat is pin attached in the manner just described. This wrist seat, as already mentioned, is adjustably attached to the press slide.

Two main types of construction are now in use for adjustment of the wrist seat in presses with a long adjustment of the slide; the rotating nut type and the rotating screw type (see Fig. 13).

In the first and most commonly used type of construction, the wrist seat is either cast or forged with an adjusting screw, or the seat and the screw are separate and are bolted together. The press slide is provided with a cylindrical recess into which a special-shape adjusting nut is inserted. This nut, while firmly held in the slide recess by a flanged sleeve bolted to the slide, can be turned for lifting or lowering the slide to suit the height of the die.

In the second construction, (the rotating adjusting screws), the wrist seat part is a long hollow cylindrical plunger which fits a cylindrical recess in the slide. The closed top end of this plunger carries the wrist seat, while the lower open end is internally threaded to fit the adjusting screw. Both kinds of slide adjustments are called the "barrel type."

Shut Height Adjustment

Long slide adjustment is advantageous where large and heavy dies of various heights are used in a press, because it eliminates the necessity of using heavy and cumbersome ring risers and stools every time a die is changed.

Wristpin-type attachment of press connections to the slide is used in all medium- and heavy-presses, in single-purpose presses, and in many light presses.

In single-purpose presses, the connection is a one-piece pitman with a wrist and pin connected directly to the slide. These presses may be used only for work with dies of identical shut heights.

The advantage of the wrist is that it never changes its seat position. The wrist and its seat work in within a relatively short time, thus assuring proper contact and transmission of pressure. Furthermore, line contact between the wrist and its seat resists forces striving to tilt the slide.

When adjusting the press slide, turning of the adjusting screw or its nut is done by hand or motor. For hand adjustment the screw is made with flats for a wrench, with a collar with holes for a pin wrench, or with a ratchet handle. In medium and heavy presses, adjust-

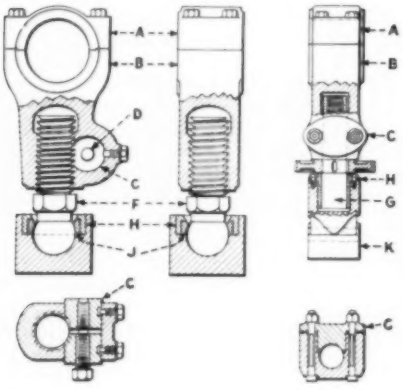


Fig. 12.. Two types of press connections with adjustable-length pitmans are used: ball and socket with split plug *(at left)*, and wristpin type *(right)* with one-piece plug. Components are: *A*—strap cap; *B*—strap; *C*—clamping plug, *D*—tightening screw in split plugs; *F*—adjusting screw, ball type; *G*—adjusting screw, flanged bottom type; *H*—holding sleeve; *J*—upper ball bearing; and *K*—wrist with pin

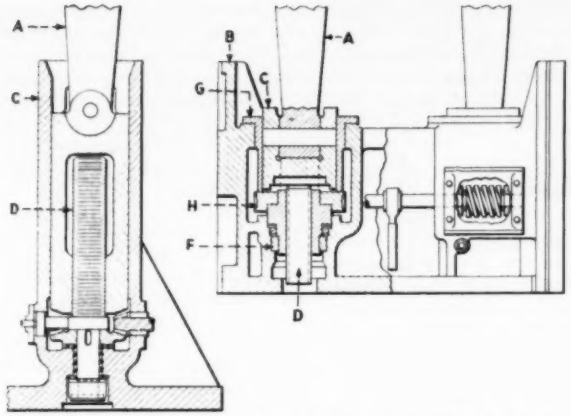


Fig. 13.. For adjustment of long slides, press connections of the barrel type are used: *left*—the rotating adjusting-nut type, and *right*—the rotating adjusting-screw type. Components are: *A*—one-piece pitman; *B*—slide; *C*—plunger (wrist seat); *D*—adjusting screw; *F*—adjusting nut; *G*—holding sleeve; and *H*—worm or cone adjustment drive

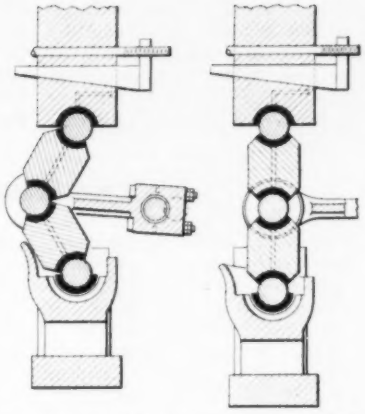


Fig. 14.. Knuckle-joint presses are employed where a maximum squeeze and minimum speed are needed to fill out a die, as in embossing or coining. The two links in the knuckle-joint mechanism are actuated by a pitman connected to the crankshaft

ment of the slide is done by means of a reversible motor mounted on the slide or crown.

In double-action presses the same type of press connections and methods for the adjustment apply to the inner slide. The blankholder slide is commonly built with four hollow end brackets, through which the adjusting screws are passed (see Figs. 2 and 10). These screws have adjusting nuts at the top and the bottom ends of the bracket. Adjusting screws in the blankholder slide are attached either to the yokes or to the rockershafts.

In knuckle-joint presses, slide motion is achieved through straightening and bending of the two hinged links, by which the slide is suspended from the crown (see Fig. 14). The upper link is connected to a wedge block which is spring suspended and held against the crown. Between the wedge block and crown there is inserted a screw-adjustable wedge for regulating the die space to suit the shut height of the die or work requirements. The links are actuated by a one-piece pitman from a crankshaft in the back of the press frame. This pitman should bend the links towards the front of the press during the up-stroke.

The knuckle-joint mechanism is usually designed in a manner such that the slide passes lower dead center twice—once on down stroke and again on its up stroke. This double squeeze at the maximum pressure and the minimum speed forces the metal to fill out the die and acquire practically a permanent set without any springback.

Press Drives

IN mechanical power presses, work is done by expenditure of kinetic energy stored in the flywheel. The flywheel is placed either directly on the crankshaft or on a driveshaft connected to the crankshaft (or gear-eccentric) through a single-, double- or triple-gear train (see Fig. 8).

Presses with a flywheel placed directly on the crankshaft are called "flywheel" or "non-geared" presses. In these presses flywheels are expected to recover spent energy during the idle portion of the revolution. Hence, these presses are used primarily for the work where flywheel energy is spent as near the end of the slide stroke as possible; namely, blanking, cutting, trimming and shallow forming of thin stock.

In geared presses, flywheel energy is transferred to the slide by gears between the driveshaft and the crankshaft or gear-eccentric. Geared presses are built in any desired pressure capacity, and are used where great pressure must be exerted at the bottom of the stroke, as in blanking, bending, coining, embossing, shearing, sizing, cold forging, etc., on heavy stock. The presses are also used where steady and continuous pressure must be exerted during the whole working stroke of the slide, as in deep drawing, reducing, ironing, bending or forming work. For the first type of work, single-geared presses are preferred, whereas for the second type of work, double- and triple-geared presses are used.

All geared presses of the crankshaft type with relatively short slide stroke and with narrow (right to left) beds are equiped with one main gear on the crankshaft and are called "single-driven geared presses." The same presses with a long stroke and wide bed are built with main gears on both ends of the crankshaft and are called "twin-drive geared presses."

Gear-eccentric presses are usually built with eccentrics held between two bull gears, Fig. 7, to obtain better transmission of flywheel energy to the eccentrics and the slide.

The gears in light geared presses

(up to 150-ton pressure capacity) are usually made of cast iron. In heavier presses they are made of cast steel. Pinions as a rule are of forged steel.

Gearing ratios in standard presses are selected to suit the average type of work for which the presses are intended. One should make certain of ample revolutions of the flywheel to regain its energy between working strokes.

Press Clutches

TIMING and control of the intermittent reciprocating movement of the slide in a mechanical power press are achieved by placing a clutch in the drive mechanism.

Types of press clutches and where they are used are listed in Table II. They are divided in this table in three major groups: (1) positive clutches—where the driven and driving members of the clutch are interlocked in engagement; (2) friction clutches—where engagement between the driving and driven members is achieved through friction contact, and (3) electromagnetic clutches — where the driven member follows the driving member due to magnetic attraction.

In presses with positive clutches the slide is usually stopped at upper position. In these presses, lowering (bumping) or backing-up (lifting) of the slide during die-setting must be done by turning the flywheel or main gear by hand, chain block or a hand bar passed through an eye in the crankshaft.

In presses with friction clutches the slides can be started, stopped and reversed at any point in the stroke. This feature is convenient for setting and adjusting dies, especially in heavy and large presses.

Electromagnetic clutches are used mainly in light presses. Presses equipped with these clutches can be started, stopped and reversed with variable torsional forces, which is convenient in setting dies and operating the machines.

Positive clutches are always placed on the main shaft of the press. Hence, engagement of the clutch and movement of the slide are accompanied by a jolt, which is generally permissible only for comparatively light presses.

Cushioned engagement of friction clutches, supplemented in heavy presses by a retarding gear train drive between the driveshaft and the crankshaft or gear-eccentrics, results in smoother action of the whole press mechanism. Such clutches are advisable for large, powerful presses using heavy dies.

Electromagnetic clutches are placed in flywheels of non-geared and geared presses. By controlling the current, the clutch can be started with variable torsional force. This feature gives practically shock-free starting and assures longer life of working parts.

The importance of a clutch in a press cannot be overestimated. Operator safety and press output depend on the action, reliability and sturdiness of the clutch. Furthermore, clutch construction should be simple, so that maintenance can be handled by the average maintenance crew.

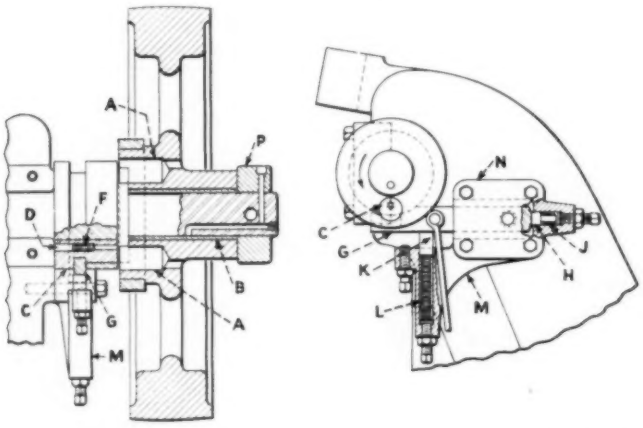


Fig. 15 . . Sliding-pin clutches are commonly used on light presses by most press builders. The single-pin type was developed by the Max Ams Machine Co. Elements of the device are: *A*—striking pin; *B*—flywheel bushing; *C*—clutch sliding pin (rectangular in other designs); *D*—clutch spring pin; *F*—clutch sliding-pin spring; *G*—clutch throwout; *H*—clutch throwout thrust pin; *J*—thrust pin buffer spring; *K*—clutch throwout lifting plunger; *L*—clutch throwout spring; *M*—clutch bracket; *N*—clutch throwout cover; and *P*—collar

Sliding-Pin Clutches

The oldest and the most commonly used type of clutch for light presses is the sliding-pin clutch, Fig. 15, which is used with minor modifications by many press builders.

The spring-loaded sliding pin is located in the collar forged on the crankshaft and is held there by a throwout. The press operator moves the throwout down or aside by depressing the treadle, thus allowing the sliding pin to be pushed out by its spring and enter a groove in the hub of the driving wheel (flywheel or main gear). This locks the driving wheel to the crankshaft.

If the operator releases the treadle immediately after starting the press, the throwout is immediately returned to the original position by its spring. Now, when the sliding pin comes along it is forced inside the clutch collar, disengaging the drive wheel.

Driving wheels usually have two or three grooves for engagement by the sliding pin, to speed up operation of the press. The grooves are usually faced with "striking" pins where the sliding pin engages the driving wheel, and with "backing" pins on the sides opposite to the striking pins.

The backing pins serve to engage the clutch sliding pin for lifting the press slide during die-setting. These pins also limit momentary disengagement, with the following

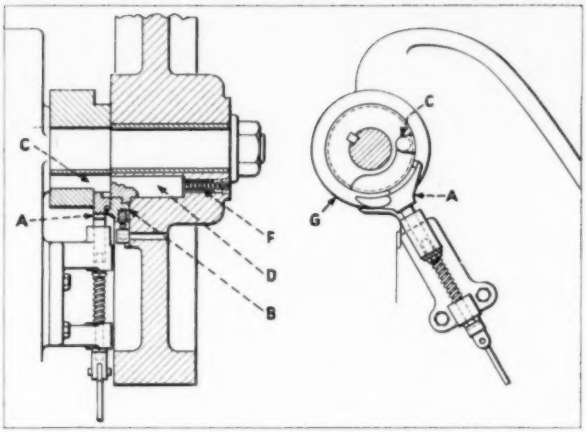


Fig. 16.. Multiple-pin clutches, as in the design by Toledo Machine & Tool Co., engage fast and continue to operate if one pin breaks. Components are: *A*—clutch throwout; *B*—clutch trigger block; *C*—striking pin; *D*—clutch sliding pin; *F*—clutch pin spring; and *G*—clutch collar

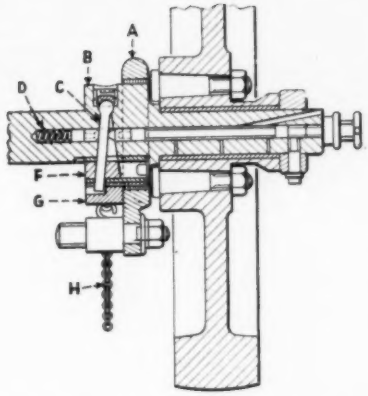


Fig. 17.. A pusher bar is used to actuate the sliding-pin clutch developed by the Ferracute Machine Co. Main parts are: *A*—striking pin; *B*—clutch collar; *C*—clutch pusher bar; *D*—pusher bar spring; *F*—clutch sliding pin; *G*—clutch throwout; *H*—treadle chain to throwout

rebound, between the clutch sliding pin and the driving wheel. This condition is caused by the speeding up of crankshaft rotation by the slide on its down stroke at breakthrough or the up stroke when the die is equipped with springs or a die cushion.

In another construction of a sliding-pin clutch, see Fig. 16, the clutch pin is inserted in the hub of the driving wheel where it is locked and kept out of engagement with the crankshaft by a spring-actuated trigger block. When the press operator depresses the treadle, pulling aside the clutch throwout, its lower cam-shaped edge engages and pushes down the trigger block. This lets the sliding pin move out of the driving wheel hub and enter the groove in the clutch collar keyed to the crankshaft. Now, the driving wheel is locked to crankshaft.

After starting the press, the operator must release the treadle for the throwout to be lifted by its spring. At the end of a complete revolution of the drive wheel, the clutch pin strikes the throwout. Then, the upper cam face of the throwout forces the clutch sliding pin inside the wheel hub, and lets the spring-loaded trigger block lock it there out of engagement with the crankshaft collar.

This clutch has more parts than the previously described model and, consequently, more points for possible mechanical trouble. It is harder for the maintenance crew to place this clutch back in working condition in case of trouble, because repair involves matching three cam-shaped parts—the throwout, the sliding pin, and the trigger block.

Fig. 17 shows a sliding-pin clutch in which the sliding pin is actuated by an oscillating pusher bar passed through it and an oblong slot in the crankshaft collar. This pusher bar is under constant pressure from a spring-loaded pin inside the bored hole in the crankshaft. The pin strives to move the pusher bar with the sliding pin outward and thus throw the latter in engagement with one of four striking pins protruding from the hub of the driving wheel. A cam-shaped throwout, spring loaded and connected to the press treadle, keeps the pusher bar with its sliding pin from engaging with the protruding striking pins and controls the timing of the engagement between the crankshaft and the driving wheel.

Rolling-Key Clutches

The rolling-key clutch is now used by about three or four press building concerns the world over, because the device must be precision made and is expensive to service.

Fig. 18 shows the construction of a rolling-key clutch now in use. In this clutch the means for controlling engagement and idling are placed inside the hub of the driving wheel. This wheel is lined on both ends with individual bearing rings. When idling, the wheel rides on two collars correspondingly fixed on the crankshaft end.

Engagement forces are absorbed by a hardened steel bushing keyed to the wheel between the bearing rings. Four longitudinal arched grooves are provided on the inner face of the bushing for engagement with the rolling key. The clutch key is equipped at its outer end with a torsion spring which strives to turn or rock it in its seat, and thus to throw the crankshaft into engagement with the driving wheel.

The clutch key has a specially shaped hook at its frame end to engage a throwout (latch), keeping the key out of engagement. When the operator depresses the treadle and moves the throwout aside (see dotted lines) in view *C*, Fig. 18, the clutch spring turns the key in its seat until its hook abuts the clutch collar. Thus, exact working position of the key is assured for proper engagement between the shaft and the driving wheel.

The shape of the clutch hook and the construction and the position

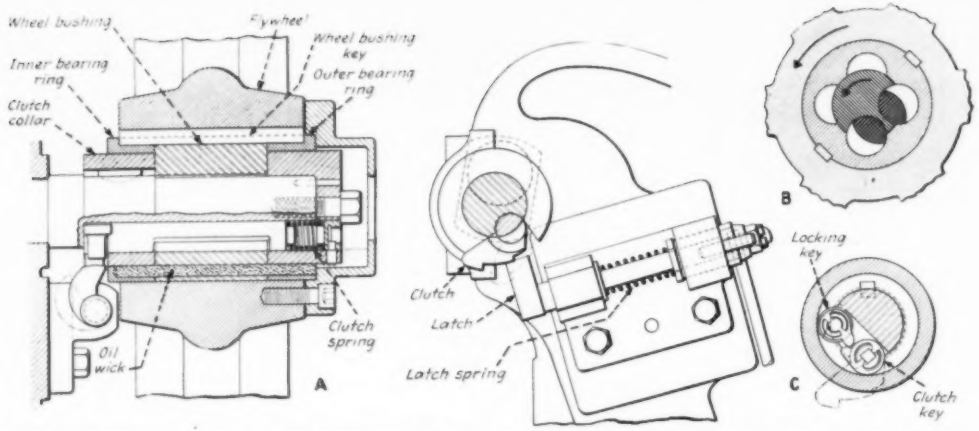


Fig. 18.. Rolling-key clutches are not extensively used because of their cost and service problems, but have definite advantages in smooth engagement and disengagement. This design, developed by E. W. Bliss Co., shows at View *A* a rolling-key clutch without a locking key. View *B* shows the clutch and locking keys in engaged position, while View *C* illustrates the interlocking arrangement between the clutch and locking keys

of the throwout are designed to achieve a cushioned withdrawal of the key from its engagement position with enough over-ride for the press brake to stop the rotation of the crankshaft.

All rolling-key clutches must be provided with means for locking (and backing-up) the shaft with the driving wheel. This prevents momentary disengagement of the key, with consequent pick-up knock when the crankshaft runs ahead of the drive wheel.

In the illustrated design, locking of the shaft to the drive wheel is achieved by embedding an additional locking key in the shaft end. This key is similar to the clutch key but is made without a hook. The locking key is loaded with a torsional spring which tends to turn and place it in engagement with the rebound side in the groove adjoining to the working one (see view *B*, Fig. 18). Action and timing of the locking key are controlled by the clutch key through two gear-shaped cams mounted on the outer ends of both keys (see view *C*, Fig. 18).

The advantages of rolling-key clutches are:

1. Low engagement speed, due to the closeness of the clutch key to the shaft axis. This permits faster flywheel speed plus ability to make flywheels lighter and smaller than in presses of same pressure capacity but with a different type of clutch.

2. Balanced and central engagement of the driving wheel.

3. Positive locking of the shaft to the drive wheel in either direction.

Sliding-Key Clutches

One recent development in positive clutches is the sliding-key clutch, Fig. 19. In this clutch the means for idling and clutching are placed inside the hub of the driving wheel.

The drive wheel rides on roller bearings during the idling period, and has a hardened steel bushing keyed between these bearings for engagement purposes. The bushing bore is made with clearance so that it does not ride on the shaft end. It is made with four longitudinal grooves and with one or two crosswise (diametrical) grooves, thus forming eight to twelve internal ridges or gear-shaped teeth.

The sliding key is made from a cylindrical bar. It is embedded half way into the shaft end and is turned down flush with the shaft, except for portions that fit loosely in the crosswise grooves in the wheel bushing. The outer end of the key is loaded by a compression spring which tends to move it towards the press frame. But movement of the clutch key is restrained by a throwout-key in the shaft. The position of the throwout-key is determined and controlled by the press throwout, which is connected to the treadle.

When the operator depresses the treadle and lifts the press throwout, the throwout-key and the clutch key are free to move toward the press frame under action of the clutch spring. This movement of the keys is possible only when the protruding teeth of the clutch key are able to enter the first longitudinal grooves in the rotating wheel bushing which comes along. In this position the clutch key teeth become interlocked with the internal gear teeth of the bushing, forcing the crankshaft to turn and starting the press slide.

When the press operator releases the treadle, the press throwout is forced down by its spring. Its wedge-shaped end contacts the throwout-key and forces it and the clutch key towards the outer end of the shaft, this disengaging the clutch key from the wheel bushing. The throwout-key is provided with a spring-loaded pin which assures cushioned engagement and trigger-like disengagement of the clutch key.

Jaw Clutches

Jaw clutches were originally developed for heavy, slow-moving steel mill machinery. In improved form they were adopted for and

were widely used in medium-pressure power presses until the second quarter of this century. They are, however, still used in gapframe punches and shears.

Recently a multiple-jaw clutch, Fig. 20, has been applied to light to medium power presses. The driving wheel freely rotates on an overhanging end of the crankshaft. Frame side of the wheel hub carries a jaw-type faceplate with 14 teeth. Engagement between the driving wheel and the crankshaft is carried out by a clutch collar placed on the crankshaft end between the press frame and the driving wheel. The collar slides to and from the driving wheel for engagement or disengagement at the will of the operator.

For engaging the drive wheel, the clutch collar has 14 teeth on its hub side to match those on the jaw plate. Bore of the clutch collar has internal splines interlocking with external splines on the shaft end.

Position and movement of the clutch collar are controlled by the clutch throwout roller. This roller fits a cam groove on the outer face of the clutch collar. The cam groove is of such shape that when the throwout roller is in the groove, it keeps the clutch out of engagement until the operator depresses the treadle and removes the roller from its cam groove.

Friction Clutches

Friction clutches are used in power presses of medium to heavy pressure capacities.

In presses intended for work with hot metal, friction clutches are placed on the crankshaft in order to shorten the time interval between placing the hot metal in the die and the action of the slide, and thus to prevent annealing of the die. Otherwise, friction clutches are placed on the drive shaft and mostly in the flywheel.

Since the general run of press work is of an intermittent character, friction clutches are always combined with brakes, which are continuously in operation except when the clutch is in engagement.

Friction clutches of the multiple-disk type, air or hydraulically operated, were used exclusively until recently in all power presses. There is now tendency towards the use of band-type clutches and brakes, because multiple-disk clutches and brakes in the fully in-

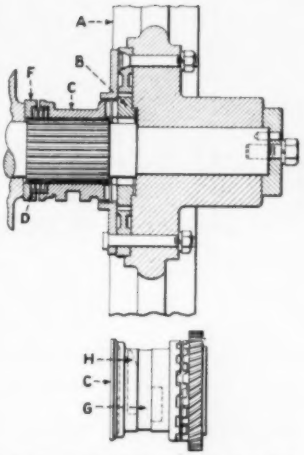


Fig. 20 . . Multiple teeth in this jaw clutch patented by Niagara Machine & Tool Works assure uniform action and continuous operation, even though a jaw tooth or spline should fail. Important parts are: *A*—driving wheel; *B*—jaw faceplate (made with helical gears for anti-rattling purposes); *C*—clutch collar; *D*—clutch compression spring; *F*—spring centering disk; *G*—clutch collar cam groove; and *H*—clutch collar cam

closed streamlined presses may overheat, when they frequently started on single-stroke basis.

Combined Friction Clutches and Brakes

Design principles are largely the same in combined multiple-disk friction clutches and brakes now in use. Compressed air is more often used than oil as an operating medium.

An air-operated design is shown in Fig. 21. In this clutch both the clutch and brake elements are assembled as a unit on a clutch sleeve. A single actuating member—the clutch actuating disk—serves to operate both the clutch and the brake.

The clutch sleeve is keyed to the drive shaft. It has a flange on its flywheel side and is made with external splines. These splines interlock with internal splines in two friction (driven) disks in the clutch-actuating disk and, finally, in the air-cylinder block.

Three flat friction (driving) disks are used in this clutch for transmitting flywheel energy to the press slide. These friction disks

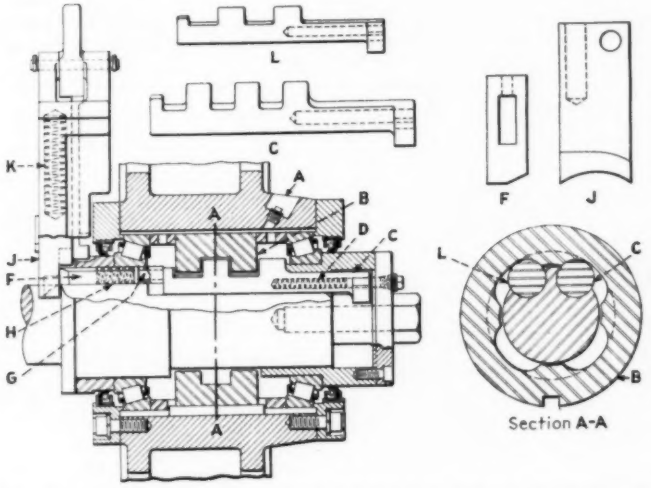


Fig. 19 . . In sliding-key clutches, the sliding key is subject to shearing stresses only. In this design, developed by the Minster Machine Co., the principal components are: *A*—Driving wheel; *B*—driving wheel bushing; *C*—clutch sliding key; *D*—clutch compression spring; *F*—clutch throwout key; *G*—clutch throwout key pin; *H*—clutch throwout key pin spring; *J*—press throwout; *K*—press throwout spring; and *L*—locking pawl with two teeth

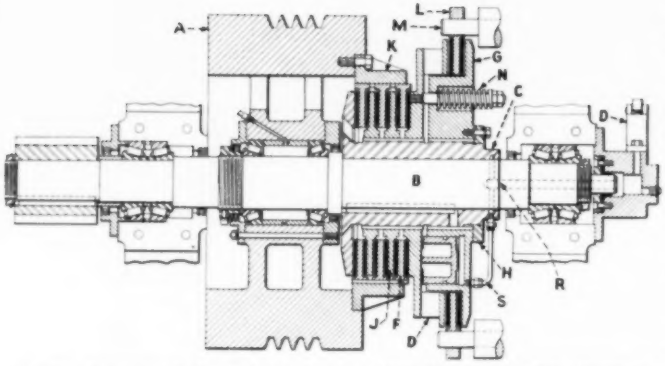


Fig. 21..Compressed air admitted to air cylinders forces the clutch-actuating disk towards the clutch sleeve flange for clamping the multiple friction disks, the brake being simultaneously released. Principal parts of this design by Minster Machine Co. are: *A*—flywheel; *B*—driveshaft; *C*—clutch sleeve; *D*—clutch actuating disk; *F*—driven friction disk; *G*—air cylinder block; *H*—clutch adjusting disk; *J*—driving friction disk; *K*—flywheel clutch ring; *L*—brake friction disk; *M*—brake disk pin; *N*—brake spring; *P*—solenoid valve; *R*—bored air duct in shaft; *S*—clutch air conduit

are made with external splines, which match internal splines in the clutch ring bolted to the flywheel rim.

The driven and driving friction disks are assembled alternately in the clutch. While the disks can freely slide axially they are confined between the sleeve edge and the clutch-actuating disk. Friction contact between the disks is created through pressure exerted on the clutch-actuating disk by six air pistons.

The brake in this clutch consists of a large-diameter friction ring suspended on three pins fixed in the press frame. This ring is placed between a flange on the air cylinder block and a flat rim on the clutch-actuating disk. Six compression springs are nested in a circle in the air-cylinder block. These springs, through studs bolted to the clutch-actuating disk, force it against the brake ring and the flange on the air-cylinder block. Clamping force of these springs is adjusted to create enough friction in the brake to overcome the inertia of all moving parts in the press and hold the slide with the attached punch in any position.

Other types of friction clutches vary in respect to number and arrangement of friction disks, air cylinders, etc.

Drum-Type Friction Clutch and Brake

To avoid multiple friction disks, the drum-type combined friction clutch and brake, Fig. 22, has been developed. The inner surface of the flywheel rim is used as the friction-clutch drum member. Operating members are two circular flanged segments of Z-shaped cross-section.

Primary element of the clutch mechanism is the clutch housing, which is keyed to the drive shaft. It contains two oil- or air-operated-cylinders with pistons, plus two wide, fork-shaped brackets for the clutch and brake operating levers, and two fork-type supports for the brake springs. Each set of these parts is located in the clutch housing, but in diametrically opposite direction.

Each clutch lever is keyed to an eccentric, which is pin connected to its forked bracket in the clutch housing. On the same eccentrics are assembled the Z (clutch and brake) segments.

The clutch is shown disengaged in Fig. 22. The brake springs force the short ends of the clutch levers outward, and in this manner hold the eccentrics turned towards the drive shaft. The eccentrics, when turned into this position, shift the Z segments towards the brake.

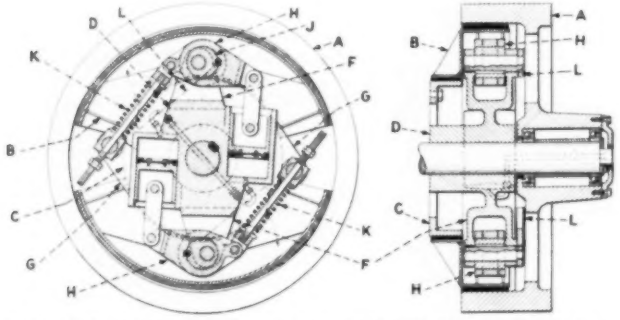


Fig. 22..Z-shaped operating segments are faced with friction material to engage the flywheel or the brake drum in this oil-operated, drum-type friction clutch and brake developed by the Cleveland Punch & Shear Works. Components of the mechanism are: *A*—flywheel; *B*—Z-shaped operating segments; *C*—brake drums; *D*—clutch housing with oil cylinders; *F*—lever bracket, fork shaped; *G*—spring support, fork shaped; *H*—clutch lever; *J*—clutch operating eccentric; *K*—brake spring; *L*—intensifier

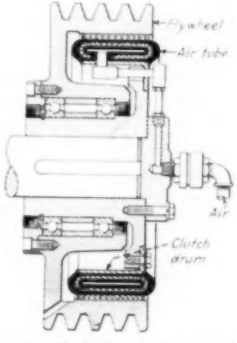


Fig. 23 — Inflation of an air tube faced with friction material produces clutching action in the air clutch developed by Fawick Airflex Co. Principal parts are: Flywheel, clutch drum and air tube

For starting the press, the operator admits air or oil to the clutch cylinders through a solenoid valve. The clutch pistons, through links, force the clutch levers towards the flywheel rim. This movement of the levers turns the eccentrics, forces the outer Z flanges against the inner face of the flywheel rim while simultaneously releasing the brake. Thus the clutch is thrown into engagement and the press started.

Special Clutches

Two types of press clutches should be considered, although they are furnished only on special order.

The first is an air-tube clutch, which has ring-shaped flat air tube made of a rubberized fabric. The tube can be inflated or deflated at the wish of the press operator. The clutch is of the drum type with the tube bonded either inside the rim of a drum attached to the driving wheel (contracting type), or to the outside face of the driven pulley (expanding type). Working face of the tube is lined with a number of detachable friction plates, which can be replaced in case of an excessive wear. It is claimed that the clutch is extremely resilient in its engagement.

The second type is the electromagnetic clutch, in which the driven wheel is induced to follow the driving wheel by magnetic attraction, exclusively, there being no contact between them. The driven wheel has a wide flange rim which is placed between the magnetic poles in the driving wheel and in the brake drum, but separate from each by an air gap. Depending where the electric current is directed, the driven wheel is either induced to follow the rotation of the driving wheel or it is immobilized by the brake. The torque in this clutch can be regulated within wide limits.

Safety Clutches

All press clutches remain in engagement and the slide continues its movement to and from the press table until the press operator releases the treadle or hand lever, turns off the valve or pushes the stop button in the electric control system.

This feature in the operation of

Table II . . . Classification of Press Clutches

CLUTCH				DRIVE				
Group	Construction	Crankshaft Dia (up to), in.	Driving-Wheel Speed, rpm	Flywheel	Single-Geared	Multiple-Geared	Smoothness of engagement	Reparability by shop maintenance crew
POSITIVE	Sliding-pin	4½	125	yes	yes	no	D	yes
	Rolling-key	6	150	"	"	"	C	no
	Sliding-key	5½	150	"	"	"	C	yes*
	Multiple-jaw	6½	200	"	"	"	D	no
FRICTION	Multiple-disk	from 6½	up to 450	no	yes	yes	B	yes*
	Drum			"	"	"	B	yes*
SPECIAL	Air-tube, friction	...	...	yes	yes	yes	B	no
	Electromagnetic	...	...	"	...	...	A	yes

*Requires well-equipped repair shop.

Table III . . . Approximate Tonnage Capacities of Straight-Sided Presses at Bottom of Stroke*

Crankshaft Dia at main bearings In.	TONNAGE Single-Crank Press	TONNAGE Double-Crank Press	Crankshaft Dia at main bearings In.	TONNAGE Single-Crank Press	TONNAGE Double-Crank Press
1	3	.....	5	88	88
1⅛	4	.....	5¼	96	.....
1¼	4.5	.....	5½	106	106
1⅜	6	.....	6	126	126
1½	7.5	.....	6½	150	150
1⅝	9	.....	7	180	180
1¾	10.5	.....	7½	215	215
1⅞	12	.....	8	255	255
2	14	.....	9	345	345
2⅛	16	.....	9½	.....	400
2¼	18	.....	10	440	450
2½	22	22	11	545	650
2⅝	24	.....	12	665	900
2¾	26.5	26.5	13	790	1150
2⅞	28	.....	14	920	1400
3	31.5	31.5	15	1060	1700
3¼	37	37	16	.....	2000
3⅜	40	.....	16½	1300	.....
3½	43	43	17	.....	2300
3¾	50	.....	18	1560	2700
4	56	56	20	1950	.....
4¼	65	.....	21	2150	4000
4½	71	71	22	2380	.....
4¾	80	.....	24	2860	.....

*Adopted by the Committee on Metalworking Machinery of the Technical Committee on Standard Commodity Classification, Division of Statistical Standards, Bureau of the Budget, Washington 25, D. C.

Table IV . . . Strength of Frames in Built-Up Four Tierod Frame Presses

(Permissible loads—10,000 psi)

Tierod OD In.	Frame Strength Tons	Tierod OD In.	Frame Strength Tons	Tierod OD In.	Frame Strength Tons
2	46	4	212	8	926
2¼	60	4½	274	8½	1050
2½	74	5	343	9	1182
2¾	92	5½	421	9½	1323
3	112	6	506	10	1471
3¼	134	6½	599	10½	1627
3½	158	7	700	11	1790
3¾	184	7½	809	12	2141

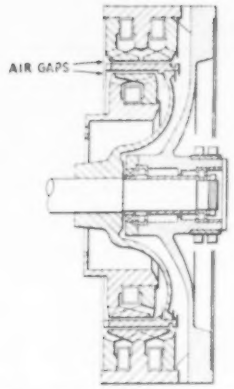


Fig. 24 — An electromagnetic field is used by the Dynamatic Corp. to establish clutching or braking action

all presses is the major cause of accidents to operators who absent-mindedly reach between the dies before stopping the press. Therefore, all presses can now be supplied, at a special order, with clutches arranged for automatic stopping of the press after each stroke of the press. These clutches are called "single stroke, non-repeating safety clutches," or briefly, "safety clutches."

In all positive clutches the safety arrangement consists of a cam on the shaft collar or sleeve, which at the proper time disconnects the clutch throwout from the treadle or hand lever. The release throwout is then lifted by its own spring in time to disengage the clutch. In electrically controlled clutches, relays in the control panel can be arranged to switch the current in the valve solenoid after each stroke of the slide.

Brakes for Presses

Brakes in power presses serve for stopping the press slide, with an attached punch, in its uppermost or, in fact, in any other position of the stroke as soon as the clutch is disengaged. The press brake must thus absorb both the static and the kinetic energies of all sliding and rotating parts in a press. This is achieved by having a friction element in the drive or clutch mechanism of the press, to convert these energies into heat and dissipate it.

Brakes in presses with positive clutches are placed on the outer crankshaft end, opposite to the drive wheel end. They are as a rule made of a continuous-acting type and are of the yoke, band or double-shoe construction. Brakes in presses with friction clutches are of the single- or multiple-disk or of the drum type, are interlocked with the clutches and work intermittently only, when the clutch is in a disengaged position.

There is no doubt that all brakes should be of an intermittent working type—release during the working stroke of the slide — and engaged when the clutch is disengaged and the slide in its rest position. Intermittent operation of the brake must be reliable in presses with automatic feeds.

Rating in Pressure Capacity

Single-action power presses are rated according to their pressure capacities near the bottom of the slide stroke. The torsional forces, the design of the shafts, pins (mainshafts), gears, flywheels, clutches, etc. are determined by these pressure capacities.

In crankshaft presses the permissible torsional strength of the crankshaft determines directly the pressure capacity of the presses. Table III gives U.S. Government ratings for capacities of crankshaft presses according to crankshaft diameter. The figures in this table are based on a torsional strength of 12,000 psi in crankshafts forged of 0.40-0.50 carbon steel and having bearings on each side of their cranks.

For gear-eccentric presses there is no such simple indicator available for determining the pressure capacities. The trade, therefore, adopted a policy of indicating the pressure capacity of these presses in the model number. For example, "Verson" 175-SI-36 denotes a 175-ton, straight-side, one-point suspension press measuring 36 in. between uprights, while "Cleveland 4-120-1000" denotes a four-point suspension press, 120 in. between uprights and of 1000-ton capacity.

In case of fully inclosed presses where it is hard to get to the main crankshaft for measurements or where the indications in the press model number are somewhat confusing, the capacity of the press can be approximately ascertained from the strength of the frame.

In one-piece, solid cast presses the frame strength depends on the strength of the cross-sectional area of the uprights in the straight side, and on the bulbous parts in the stands in the gapframe presses. The permissible loads are: one ton per each square inch of the cross-section in cast-iron presses and three tons in cast-steel presses.

In built-up four tierod frame presses the strength of the press frame and, consequently, the pressure capacity of the press depends upon the strength of the tierods used. Table IV gives the diameters of the tierods and pressure capacities of presses using them.

In double-action presses the rated capacity is usually stated for the inner (plunger) slide only. It is rated in the same manner as in single-action presses.

Since drawing work usually starts just as the inner slide passes midstroke, it must be remembered that the pressure capacity of the slide is then at its minimum. This midstroke pressure capacity of the inner slide depends upon the construction details of the press, especially upon the ratio of the stroke of the slide to the length of the pitman in the press connection. The longer the pitman and the shorter the stroke of the slide, the smaller the difference between the midstroke and bottom-stroke pressure capacities of the inner (plunger) slide in double-action presses. It is advisable to secure from the press builder the exact figures of the midstroke and bottom-stroke pressure capacities of the inner slide in double-action presses.

Press Sources

Mechanical power presses are machines which can be found practically in every machine shop. The demand for these presses in spite of their extremely long useful service is quite steady, which explains the numerous makes of them now available.

Not every press building plant, however, builds all types and sizes of presses. Sources of presses and the kinds available from the various builders are listed in the Reference Book Sheet on page 137.

ROUND TABLE

Dress Up or Dress Down!

"What's up, Ed? Some of those ancient announcements on the bulletin board still irritating you? Why do you pay any attention? I gave up looking at it months ago because I found nobody ever changes it."

"That's just what I'm thinking about, Al. It's time this board got dressed up—and whoever is supposed to keep it in shape ought to be dressed down for falling down on the job."

"Why do we need the board anyhow, Ed? We've got a plant magazine for news, letters for announcements, posters for safety and everything else. The bulletin board is as out of date here as a whip socket on an automobile."

"Even if we put in that speaker system they've been talking about, and dress up all the other doodads you're talking about, Al, the bulletin board can still be the most effective thing we've got. Dress it up and keep the notices up to date, and everybody will read 'em. It is a lot cheaper than all those other gadgets, too."

"Just how would you get anybody to read that board nowadays, Ed?"

"It's in the right spot already, here by the drinking fountain. Give it a new coat of paint and make the personnel man responsible for it. Make him understand that he's got to keep it neat, up to date, and with a lot of interesting things on it—not just routine orders."

"You mean add pictures of dames and some jokes, and such?"

"It wouldn't hurt, but I was thinking of cartoons and safety posters and industrial pictures and facts about the company, Al. That would catch everybody's eye."

"Why not put those things in the house organ and let everybody take 'em home?"

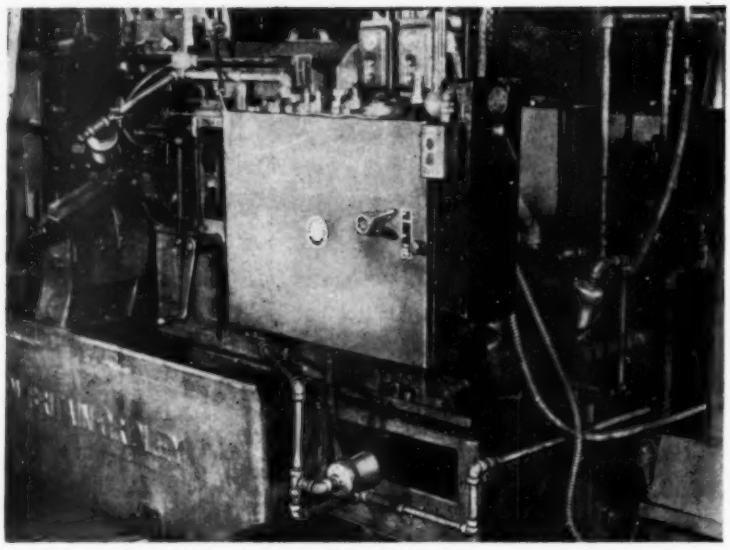
"Because the house organ *can't*—and *shouldn't*—publish some of 'em. Why take shop cartoons and shop safety ideas home? We need 'em here. The house organ ought to include stuff that interests the whole family, so everybody at home begins to understand the whole business here. Get the board dressed up with shop things, the house organ with family or personnel things."

"A good idea, Ed, in theory, but it won't work. The boards are too hard to read, get dirty pronto, always look messy, and are always where a crowd would cause a safety hazard."

"Then move the board where it isn't a hazard, keep it at eye level—and keep it cleaned up. That's a cinch. What's more, if one guy is responsible for keeping boards neat and up to date, he can also be taught what ought to go on, and what oughtn't to. I'm going to talk to Personnel about it."

"And get one more long-winded bulletin to curl and gather dust, eh?"

***SHOULD SOME ONE PERSON** have responsibility for all bulletin boards—or should each foreman handle his own? How can one be made effective—or are they obsolete? Your ideas and opinions on this subject will be appreciated by others. Discussions of earlier topics appear on later pages.*



Four discharge nozzles for carbon dioxide are visible in view of one of the screw machines. One is near the work area and three near the cutting-oil reservoir and circulating pump

STOPPING FIRES IN SCREW MACHINES

Automatic extinguishing system built into screw machines using light cutting oil extinguishes flash fires without serious damage

BY WALTER E. MORGAN
Manager, Industrial Division
WALTER KIDDE & CO. INC.

UNTIL about a year ago, ignition of cutting oils employed in production of valve-stem guides on a bank of automatic screw machines caused two or three fires every week in the parts plant of one of the country's largest automotive manufacturers.

That was before engineers of Walter Kidde & Company designed and installed an automatic carbon-dioxide fire extinguishing system that provided dependable protection, eliminated hours of downtime for machine repair, and prevented pollution of cutting coolant.

The machining process that posed the serious fire problem was the manufacture of alloy cast-iron valve-stem guides on a bank of three 6-spindle New Britain-Gridley automatic screw machines. Ordinary cutting oil and speeds near 1800 rpm were originally used in the process, but with a Bhn of 217 and an unhomogeneous structure, the alloy caused rapid wear and frequent breakage of bits in drills and reamers. For the high-accuracy drilling operations (0.001-in. tolerance for the center bore) special tools made of hard-alloy steels such as Tantung were used.

To solve the problem of tool destruction, the parts manufacturer eventually resorted to the use of light cutting oils. But the solution of tool spoilage introduced another problem. The lighter oil had a flash point of only 155 F and, at first, resulted in two or three costly flash fires a week. Reduction of cutting speed to 800 rpm somewhat lessened the fire hazard, but by the very nature of the machining process, the danger of fire could not be eliminated.

These fires usually started in the cutting area of the screw machines, which was covered with a hood. Before the automatic carbon-dioxide system was installed, fires were extinguished with portable foam-type extinguishers. Use of foam necessitated time-consuming clean-up and it also got into the coolant circulation system, making it necessary to replace 275 gal. of coolant after each fire. At 18 to 20 cents per gal. this coolant adulteration was costly.

Downtime for a machine after each fire, often amounted to two or three days because polluted oil had to be pumped out and replenished with new, and the machining work space had to be thoroughly cleansed of the foam extinguishing agent. The general foreman stated that 16 hours had been minimum

downtime required after a fire.

Each of the three automatic screw machines is now equipped with two CO_2 discharge nozzles, one on each side of the cutting area under the hood. One nozzle is directed at the chuck, the other at the tool feeder.

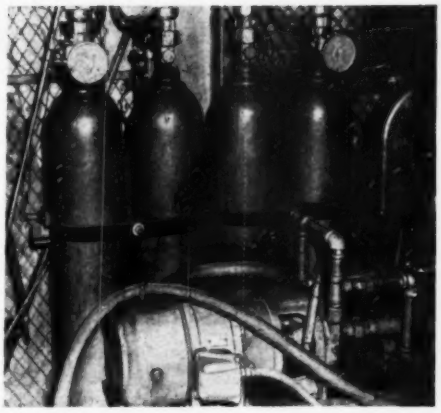
Another nozzle is directed into the top of the coolant tank, and there are additional nozzles at both ends of each machine, protecting the drip pan and oil-circulating pump.

Underneath the hood of the machine and directly above the cutting area of each screw machine is a rate-of-temperature rise heat actuator which immediately detects any unusual temperature rise, but is not affected by normal temperature fluctuations.

Piping connects the discharge nozzles protecting each machine with a bank of two large steel cylinders, each containing 50 lb of liquid CO_2 under 850-psi pressure. The heat actuator under the head of each machine is connected by metal tubing to a release mechanism on the discharge head of each cylinder bank. Each pair of cylinders is arranged for initial and reserve discharge.

If flash fire occurs in the cutting oil spray of any of the screw machines, the heat actuator immediately releases CO_2 from the storage cylinders. Under its own power, it rushes through the piping and out the discharge nozzles surrounding each machine. When it hits the air, the CO_2 turns into a gas, expands to 450 times its stored volume, and penetrates to every part of the fire-hazard area. The CO_2 quickly and safely smothers the blaze by cutting off its oxygen supply, and it leaves no messy residue.

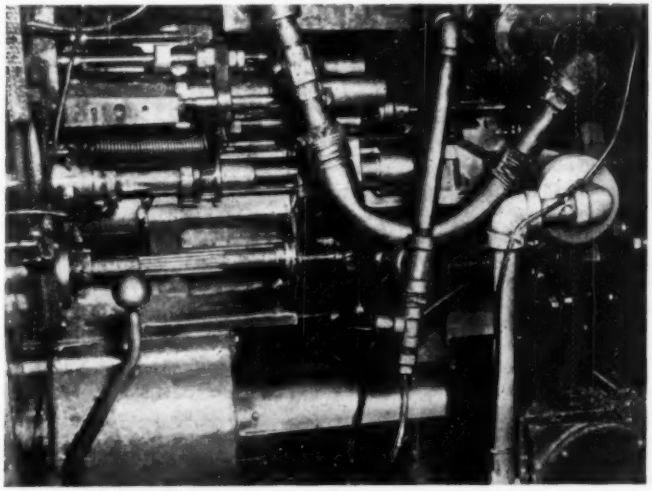
Being an inert gas, CO_2 cannot react chemically with any surface or material with which it comes in contact. Thus it does not damage delicate machinery or equipment. Add to this its property of electrical non-conductance, and its advantages for such applications as this one are easily recognized.



Pair of cylinders, each containing 100 lb of liquid CO_2 is connected to each extinguishing machine. One cylinder of each pair serves as a reserve supply

It has been reported by the automotive plant personnel that the $800 investment for the protection of each of the three machines paid for itself within the first month after installation.

As the general foreman attested: "The equipment has been a life-saver for us. Where we used to have at least 16 hours downtime whenever we had a fire, we're now ready to start the machines again within no more than one hour after the fire is extinguished."



Carbon dioxide is released automatically by heat detector (not shown) if there is a sudden increase in temperature under the machine hood

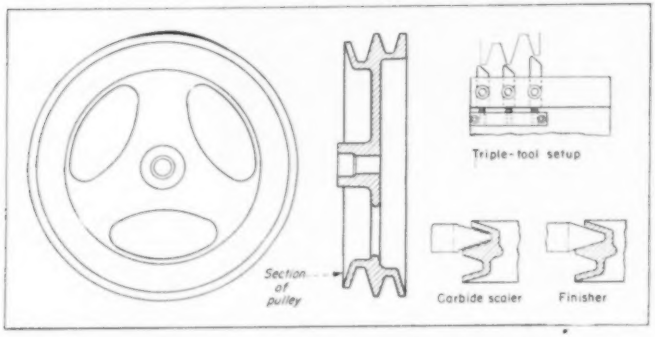
Tips FOR TOP SHOP MEN

306. The more a man has to be told what to do, the less he's worth.

307. The man who can't keep regular hours or follow regular habits may be too expensive to keep, regardless of his ability. His effect on morale may be more costly than his extra value as an individual.

308. Tell your men what the company is doing—but beware of telling too much. The things most people want to know about are none of their business.

Practical Ideas



Scaling Tool and V-Groove Core Increase Cast-Pulley Output

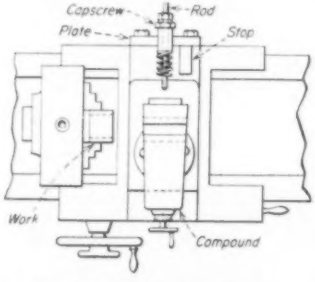
REDUCED WEIGHT and economy are two features of this V-pulley design. Instead of casting a rough piece, we cored the V-groove and cast the ribbed pulley to within 3/32 in. of final dimensions.

But even with this speeded method, production was slow because the carbide-tipped finishing tool wore fast (due to cast-iron scale) when the pulley sides were turned, first one side, then the other.

Despite opinions that it would not work, we tried a carbide scaling tool as illustrated. This was fed in to full depth on the V-grooves to cut into the scale. Finishing was then done with a conventional tool shaped like the one we formerly used.

Machining procedure was this: With a triple-tool setup on the lathe, we turned down the outside edges of the pulley. Then, with no change in setup, the scaling tool was fed in, and finally the finishing tool was brought into the work.

With the new scaling tool, the 10½-in. pulley was turned at 175 rpm with a 0.015-in. feed, which more than doubled output. The tool was run for 120 hours before it had to be reground. Not only was the machining quicker, the casting did not heat up as much as before and did not ever disturb the chucking setup, which happened often with the original tool. This scaling tool may be of use to others who have a similar problem with cast-iron products. *Frederick G. Hawk, Louisville, Ky.*



Spring-Loaded Boring Tool Relieves Itself for Roughing

MASS-PRODUCTION BORING can be done on an old lathe with fairly simple special tooling. The cross-feed screw was removed from an engine lathe and an assortment of junk parts were added to make rough and finish passes automatic.

A heavy plate was bolted to the back end of the carriage—extending above the carriage. To this a ⅞-in. capscrew with a 7/16-in. hole drilled through its center was assembled. Finally a ⅜-in. threaded rod was assembled to the end of the cross-slide to go through the capscrew. A locknut and washer on the end of the threaded rod prevented back movement of the slide, while a compression spring on the rod worked against the nut.

The compound was set straight, and the gibs on the slide were adjusted so they were snug enough to allow movement without slop. Work was mounted in a three-jaw scroll chuck and the boring tool was adjusted, with the compound dial, for the finished cut. When the first cut is taken, the boring bar backs off against spring pressure so it doesn't cut to full depth. But on the final pass, the boring bar cuts to full depth and finishes the bore.

Some adjustment of spring pressure—this spring was from an old valve—and the dial setting, in addition to the position of the locknut stop, is necessary to get the setup so the final cut will be to the right depth. After the first piece is produced to the right dimension, no alterations are necessary until the boring tool has to be reground. The same setup can be used for internal threading. *Daniel Love, Worcester, Mass.*

Laminated Bushing Braces Drill For Piercing Stainless Steel

DRILLING 1/32-in. holes in stainless parts progressed not at all without some sort of drill bushing because the drill, being long and thin, would flex and snap off. We had to have a fairly thick bushing, but drilling through tool steel was as tough as drilling stainless.

We solved the problem this way: We took a number of thin plates of bushing steel, drilled each one separately, then clamped them together with the holes in line. Then we ran the drill through once to clear chips and smooth off any misalignment and we were ready to drill the stainless-steel parts.

The plates were from ⅛ to 3/16 in. thick, and were hardened after being drilled. With the resulting thick bushing in place, the small drill pierced the work easily. *Basil Clark, Evansville, Indiana.*

Switches Gage Stock Location In Shearing Press

LARGE SHEET stock, 48 in. wide, was being sheared into 1-in. strips by placing the stock end-wise into the shearing press. Because of the awkwardness of the large stock, the one-inch strips did not come out even and were often sheared on a taper.

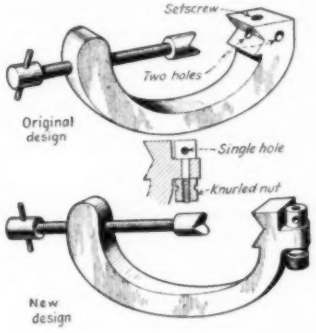
To overcome this difficulty, a Microswitch was placed at each end of the gage bar and wired in series to a solenoid-operated safety under the shear pedal. After this was done the stock had to be pushed into the shear evenly with both ends depressing the microswitches before the pedal could be operated. Miscuts were thus effectively overcome. *Bernard Levowich, Brookline, Mass.*

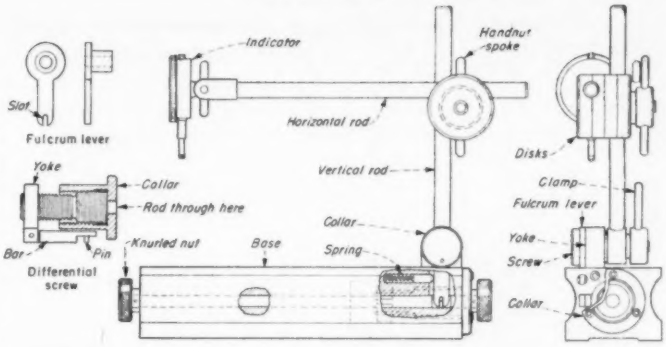
Swiveling Diamond Holder Improves Clamp Dresser

CONVENTIONAL C-clamp diamond holders can be altered slightly to give better service for many odd jobs. Normally two holes are drilled in one clamp anvil to hold the diamond holder, but this allows only two diamond settings. A swivel holder will handle more jobs.

The anvil is machined away at the front except for material in the middle which will form a yoke. This is drilled, and a round shank with a shoulder is inserted. A knurled nut serves to tighten on the threaded shank end.

A setscrew in the top of the shank seats on the holder, which can be turned around in any direction. *Ray Cafiero, Brooklyn, N. Y.*





Dial-Indicator Stand Permits Close Final Adjustment

AFTER the initial lock-up, fine adjustments can be made to a dial indicator with an adjustable stand that mounts on an inspection table or machine-tool carriage.

The heavy base is cast iron, and is ground flat and parallel on both top and bottom so gage blocks can be mounted on the top for comparison purposes. Four machined disks are drilled through, with half a hole in each one, so one set clamps on each of the two rod supports. A large handnut with spokes and a spring washer work on a screw through all four disks to clamp them tightly.

The vertical rod is pressed into a collar that is held in a clamp arrangement to the base. The collar section of the fulcrum lever fits in a yoke on the base, and a screw goes through the bore and through the collar on the rod. A handnut and spring washer at the other end of the screw lock this junction.

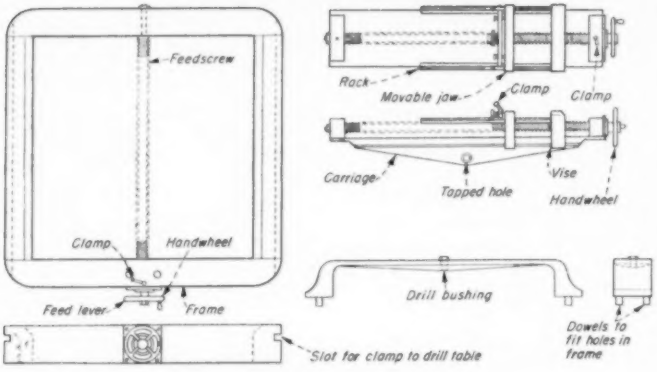
Inclination of the vertical rod, and therefore fine adjustment of the indicator, is handled through two knurled nuts at each end of a long rod through the base. The rod is keyed internally to a differential screw—one with two threads of different pitches cut on its outside —that works in a tapped collar that is fixed to the end of the base by small screws. As the rod turns the differential screw, it moves a small yoke back and forth. This moves a bar that is pinned to the yoke and which carries a small pin. The pin engages a slot in the arm of the fulcrum lever, and as it moves in one direction, it turns the lever, which also turns the vertical rod.

As the original model was made, it moves the end of the lever 0.010 in. for each complete revolution of one of the knurled nuts on the rod. This is the difference in pitches between the two threads on the differential screw. For similar action, the pitch on the larger thread could be 0.050 in., and the pitch on the smaller thread could be 0.040 in. The smaller thread is made so it will not contact the tapped thread in the tapped collar, but the larger thread engages this thread. In case the larger thread bottoms on the tapped collar, the clamp on the vertical rod must be released, the post moved back, and retightened —so all adjustment action will be away from the bottom of the collar.

Backlash is taken up by a compression spring and pin inside the base. They bear on the edge of the fulcrum lever and provide greater accuracy. *R. B. Wolverhampton, Staffordshire, England.*

A TWENTY-CENT perfume atomizer spreads layout dye evenly and quicker than other methods; and it also speeds the drying by applying it in a thinner coat.

The same atomizer, when empty, is handy for blowing filings or chips away from layout lines when you are working to them. *Theodore A. Nienast, Beloit, Wis.*



Precision Drilling Jig Speeds Spot-Drilling on Accurate Layouts

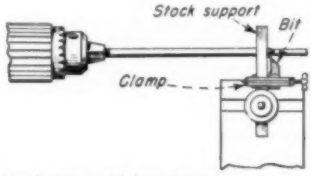
THIS JIG can be employed with any drilling machine, regardless of condition, to locate and drill accurately spaced holes in a precise layout. Originally the device was used for spotting holes in small templets for scientific-instrument components.

The device consists mainly of a frame and a carriage, both of which are fitted with accurate leadscrews. The threads were ground and were fitted with dials so either the carriage of the slide could be traversed accurately from one position to another.

A sturdy bridge was built to fit, by means of steel dowels, into drilled holes in the frame. This carries a drill bushing that guides the drill with some precision, even if the drill spindle is slightly out of line. Since it is attached to the frame, which must be bolted or clamped to the drill table, it does not move.

After one hole on the layout has been drilled, the carriage and slide are moved, corresponding to the layout dimensions, to the next hole, and so on until all holes have been drilled. Bushings can be changed to guide drills of different diameter during this shifting process because the actual center distances are being stepped off by means of dial readings.

The vise works on a rack principle, which means that the movable jaw can be opened up to take large work, or closed down on small parts. A tapped hole in the carriage matches the leadscrew in the frame, and the carriage moves on the sides of the frame, which act as ways. Similar action operates the slide on the carriage. *N. Bonamini, Glasgow, Scotland.*



Toolpost Holder Supports Small Stock for Turning

SMALL-DIAMETER STOCK of various materials can be quickly turned on a lathe with a simple guide setup that eliminates stock bending.

A piece of steel is drilled crossways with a drill that is the same size as the stock—allowing a little play for a sliding fit. Then the holder is clamped in the regular toolpost with the hole parallel to the lathe and on center. The stock is held in a Jacobs chuck and the toolbit is clamped beside the holder in position to cut the work.

Close tolerances can be held in this manner because the stock is kept rigidly on center and cannot whip. *G. J. Hondek, Cleveland, O.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT —$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS —Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author —every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

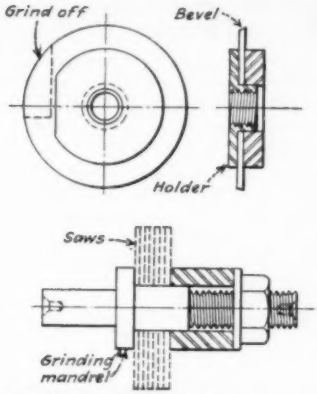
HOW TO ENTER —Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

87th Winner:

A Tie—

Michael P. Blake
Caliper Replaces Micrometer

Rex Smith
Machinists Scale Adapter



Cutoff Tools Made from Slotting Saws

SLOTTING SAWS have to be discarded after one or two teeth have broken out, but they are of good high-speed steel and should be useful in some fashion. They have all the requirements for circular cutoff tools except stiffness.

The holder illustrated braces the blades so they have *all* of the requirements for cutoff tools. The blades can be ground off by assembling a set on a mandrel and setting them up in a lathe for a toolpost grinder. Teeth can be removed, the gashes ground, and the bevels can be shaped. The holder can clamp even a single blade so it can do good cutoff work.

Two sizes are efficient for most cases. The diameters can be ground to 1¾ in. and 2¼ in., with the gashes 9/16 in. and 11/16 in. from the centers. *Otto V. Howe, Waterbury, Conn.*

BROKEN STUD BOLTS can be removed if you take a punch and mark four corners of a square on the broken cross-section. Then drill into the stud at each mark, increasing the size of drill until the holes run in together. Finally tap in a square toolbit or piece of keystock and twist the stud out with a wrench.

The same effect can be obtained by welding a square bump on the end of the stud with a gas torch and then extracting the stud with a socket wrench. *D. A. Juslon, Belgrade, Mont.*

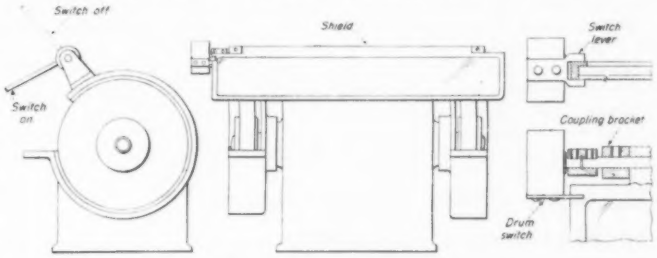
Electronic Circuit Indicates Bar-Stock Temperature

COLLARS integral with spindles are formed by upsetting the spindle stock when it is heated up to bright heat. The bulge that is formed is later machined to a rectangular cross-section. Originally the heat of the spindle stock had to be judged by an experienced operator, who started the upsetting process when the spindle was the right color. Even an experienced operator made mistakes.

This system has been replaced by an electronic circuit, making the job easy for inexperienced operators. Light from the heated work falls on a photoelectric tube, where the quantity and wave length of the light determine the output of the tube into the circuit. The outgoing signal is amplified and fed into one side of a Wheatstone Bridge. The other side of the bridge circuit receives a constant input from another tube.

The unit is calibrated for temperatures above 1400 F by an L7N optical pyrometer, and below that temperature by a "Tempilac" to within 20 F accuracy. When the vacuum-tube voltmeter across the bridge reads zero, the temperature of the bar is correct for the upsetting operation.

With this setup, bar stock up to 3½-in. dia for steel and 2¾-in. for brass can be gaged instantly. *Chapman Valve Mfg. Co., Indian Orchard, Mass.*



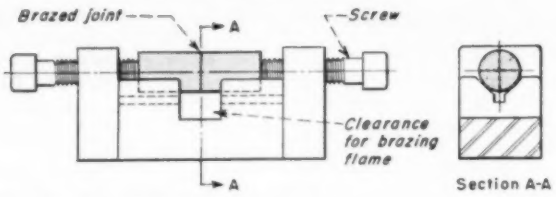
Grinder Safety Shield Switches on Motor

EYE INJURIES caused to machinists by their not wearing goggles when operating grinding machines aren't usually reduced by fitting shields to the machines because the men are just as careless with shields as they are with goggles. But in one case the whole problem of protecting the men from their own laxness was solved by fitting a grinder with a switch so the machine could not be run unless the shield was in place.

The machine was a standard rough grinder with two wheels, mounted on a floor stand. The shield was wide enough to cover both the wheels. At one end of the hinge pin that supported the shield a drum switch was mounted. This was a common kind of switch, often found in an electric cooking stove. Its main shaft was coupled firmly to the hinge pin, and a lever was attached to the body of the switch. This lever fitted over the edge of the shield.

As the operator pushes the shield down into position, the drum-switch body is rotated in respect to its center shaft, which operates the switch. The fairly wide range of action in the switch allows some leeway in shield adjustment once the switch is turned on, but the shield cannot be raised out of the way without stopping the motor.

The principle can be applied to almost any tool grinder with slight modifications to standard shields. When two shields are fitted to the same grinder, both of them should be attached to the same hinge pin so neither can be raised while the motor is running. *F. E. Riley, London, England.*



Life of Carbide Inserts Increased by Brazing

SOLID CARBIDE inserts used in automatic holders normally operate efficiently for only half their total length—about ¾ in.—and half of each insert is usually wasted. An inexpensive jig can make it possible to double the useful life of the inserts by brazing half-worn bits together.

The jig is really a V-block with two yokes—one at each end—to retain screws that hold the small carbide inserts in brazing position. Two such jigs can be made to handle all types of bits: one with a V at 90° will take square, rectangular, and round inserts, and one with the V cut at 120° will take triangular-section inserts.

Ends of the inserts should be ground square and they should be clean before being brazed. A thin sheet (0.005 in.) of brazing bronze is inserted between the inserts as they are tightened against each other, and normal brazing procedure is followed.

The procedure can be followed with all short bits left over so that over a period of time every bit of each insert is used up. *Stanley R. Welling, Racine, Wis.*

Gaging Disks Check Holes In Machined Housings

FACED WITH the problem of gaging three shaft holes in several hundred castings, we decided that checking with micrometers or calipers was too slow and impractical. A simple, inexpensive gaging method was devised based upon gaging disks.

Ground shafts were fitted into the holes, with plugs for the largest hole, and the disks were mounted on the shafts, flush with the casting. The lower limits for spacing were determined by the disks themselves—if they would not slip on the shafts, the holes were too close. Outer dimensions were checked with feeler gages between the disks. This meant that only three feelers were needed.

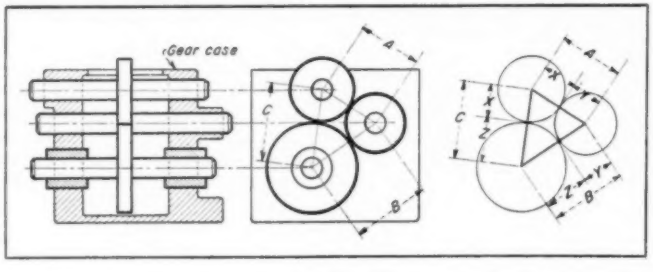
To arrive at the correct disk dimensions for any set of three spacings, the inner limits for the center distances were taken:

These were A, B, and C, and were known dimensions. Referring to the sketch, A was equal to x plus y, B was y plus z, and C was z plus x.

Therefore:

$$x - z = A - B$$
$$x + z = C$$
$$2x = A - B + C$$
$$x = \frac{A - B + C}{2}$$

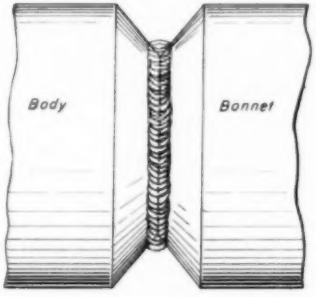
Once one of the unknowns is determined, the others can be found by substitution. If more than three bores must be checked, the fourth can be gaged against any other two holes by two different gaging disks. *H. G. Frommer, Milwaukee, Wis.*



Welded Valve Bodies Cut Extra Weight

WITH CONSTANTLY increasing design pressures and temperatures, one of the problems in assembling steel valves in large sizes is that of getting a good joint between the valve body and the bonnet. Bolt sizes become prohibitive, and relaxation and creep cause leaks.

The problem has been solved by welding the parts together in a permanent joint. Flanges and bolts



are eliminated. The two parts are assembled in a fixture and tack-welded together in four places around the joint. This holds the valve tight enough that leak tests can be made, after which the valve is set up in a welding machine.

The valve is covered with asbestos and electrically preheated to a temperature at which it can be welded. It is slowly rotated about its spindle axis as the machined V is filled.

Undesirable bolting characteristics are eliminated, and a large amount of weight, which can be important on a valve for 12-in. pipe lines, is discarded. *Chapman Valve Mfg. Co., Indian Orchard, Mass.*

NEWS OF METALWORKING

You Won't Have to Move Your Plant Inland for Security, Pentagon Says

WASHINGTON—Is your plant on a "vulnerable" seacoast? Are you worrying about the military demanding you move it inland for "security reasons"?

Relax—the Pentagon has no formal plan for relocation of industry just because Russia might be able to bomb the West Coast from the Kamchatka Peninsula of northeastern Siberia, or from a submarine or an airplane carrier.

Of course, military planners are not forgetting the possibility of such an act—but they also know that transplanting a large segment of industry—such as the West Coast plane makers—or even a large plant, would cost tremendous amounts of money. And the Pentagon hasn't that kind of money to spend on security right now.

Take a look at the way intercontinental bombing is shaping up. Flying over the pole makes Detroit just about as close to Russia as Seattle—and Detroit is an even better target than the couple of airplane plants in Seattle.

More important is the government's contention that vital war plants be dispersed when and where possible. This means that a plant should isolate itself within a circle with at least a three-mile radius. That radius is the safety factor in atomic bombing, as well as conventional bombing.

The National Security Resources Board a year ago published a pamphlet laying out the national security factors in industrial location. In this "warning to industry" the point was made that little could be done to present industrial concentrations, but that as new plants were built, or corporation expansions were made, the dispersal factor could be given consideration.

How to Choose a Site

Say a manufacturer wants to build a new plant, or expand his old one, here are two suggestions made by NSRB on choosing the site.

First: Select a site where the industrial concentration is less than five square miles, or where the population is less than 50,000.

Second: Draw a three-mile radius circle about the site's center point. This circle should not contain any other industrial facility which could be considered a good bomb target, or which would be an "explosion hazard." Such a dangerous neighbor could be an oil tank farm, a high-explosive still, a railroad junction, or an airplane plant.

Another hint made by the top level planners is to use terrain for your protection. A plant located between the folds of hills would have to take a direct hit to be damaged.

This contention was proved by the atomic bombing of Hiroshima and Nagasaki. Deaths in Nagasaki, despite its greater population density, were only one-half those at Hiroshima. The reason was that ridges of hills separated areas of Nagasaki in dispersed pockets, where Hiroshima was relatively flat and uniformly concentrated. Industry fared better at Hiroshima, mainly because of good dispersion. In Nagasaki, in the valley where the bomb exploded, all the plants concentrated there were destroyed.

Moral of this story—stop worrying about long-range geography and start thinking about local geography—where does your plant stand in relation to other "targets."

Indian Manganese-Wheat Swap Faces Obstacles

WASHINGTON—State Dept. is finding several obstacles in the way of swapping a million tons of surplus American wheat for Indian manganese that Premier Nehru suggested in his talks with Secretary Acheson.

Mr. Acheson was enthusiastic at the suggestion, but lower echelon officials have come up with these flaws in the plan: (1) Such a barter deal would rob India of dollars now earned by selling manganese to the U.S., which would leave her in a worse financial position; (2) It is unlikely that India could deliver the specified manganese by June 30, 1952, when American stockpiling legislation expires; (3) It would anger South Africa and Brazil who are pushing to develop their manganese supplies since Russia cut down on shipments.

But despite these obstacles—the latter two fairly inconsequential—it's likely that Acheson will order approval of at least a watered-down version of Nehru's plan.

***SPUR TOOTH SLEW RACK** for a giant walking dragline which carries a 20-cu yard bucket is shown here on the floor of the plant of Ransomes & Rapier, England. Measuring 33 ft 3 in. in diameter, the rack has 208 teeth of 6 in. circular pitch and a 19½ in. face. Teeth are machine cut and the ring consists of sixteen segments bolted face to face with no shims or packers. On assembly the finished rack was at no place more than 1/32 in. off, an error of not more than .008%*

ASTE Meeting in Montreal Attracts 500 Engineers

***INCREASED COOPERATION** between United States and Canadian manufacturers was urged by Victor M. Drury, president and chairman of the executive committee, Canadian Car & Foundry Co., Ltd., at the luncheon opening the seventeenth semi-annual meeting of the American Society of Tool Engineers, in Montreal, October 27-29*

U.S. Manufacturers Will Have to Work Harder For Canadian Business as British Start Drive

MONTREAL—British makers of machine tools and other production equipment are initiating a concerted drive for Canadian markets and their competitors in the United States will have to work harder for Canadian business in the future, according to Victor M. Drury, president of Canadian Car and Foundry Co. Speaking at the opening session of the 17th semi-annual meeting of the American Society of Tool Engineers here on Oct. 27, Mr. Drury said the British are "deadly serious" in their drive for increased business from American and Canadian markets.

Top-flight British salesmen and service engineers are to be located in Canada permanently, according to Mr. Drury, and they will be supported by warehouses across Canada carrying large stocks so they can match U. S. manufacturers in speed of deliveries. This does not mean that Canadian buyers will turn their backs on American suppliers, but they intend to weigh the new competition carefully. "Incidentally," he said, "Canadian engineering industries will face this formidable competition as much as you (the U. S.) will. We intend to use our best efforts to meet it."

Trade Out of Balance

Canadian trade is sadly out of balance, Mr. Drury told the ASTE delegates. "We sit between the sterling and dollar areas with a Canadian dollar which is something unto itself," he said. "That complicates our international trade. Canada's existence depends upon our exports. Before the war we sold heavily to Britain and bought heavily from the United States. We converted pounds into dollars to pay our American bills."

"Since the war, these relationships have been changed. Today, Canadian trade can be brought into balance only if you (the U. S.) buy much more from us, or we buy some $400,000,000 a year less from you. In thinking of international trade difficulties, therefore, Canada cannot be omitted. I fear many Americans forget that. Too many of them still seem to consider Canada only as an important source of raw materials. While Americans consume at home 90% of all they produce, Canada must export 35% to live."

More than 500 tool and production engineers attended this three-day ASTE semi-annual meeting. Approximately half of them came from industrial centers across the United States, the balance from Canada's enlarged metalworking industry. They took part in nine technical sessions, where 15 speakers presented papers tied in with the meeting's theme, "Economical Tooling for Short Run Production," and visited nine metalworking plants in the Montreal area.

Canadian Production Tripled

An important highlight of the convention was an address by Hon. Clarence D. Howe, Canada's minister of trade and commerce. He said that Canada has, during the last decade, tripled production in money terms and doubled it in real terms. Canadian labor income has tripled, her farm income has tripled, and her external trade has about quadrupled in value and doubled in volume. Canada is now in third place among the nations of the world in exports of manufactured goods, following the United States and the United Kingdom. In per capita terms, according to Mr. Howe, Canada's exports are much larger than the other two. In short, he said, Canada has come of age, industrially, within the past eight years.

Before the war, according to Mr. Howe, Canadian industry was heavily dependent on imported parts. Today, Canada's manufacturing industries have become important users of one another's products. Over 200 products which were formerly imported are now being produced in Canada. With all this, Canada remains an important market for imported machinery and equipment, imports in this class averaging about $500 millions a year.

Prosperity in Canada, Mr. Howe said, depends upon conditions existing both in the United States and in the United Kingdom. These two countries take 70% of Canada's exports and supply 80% of her imports. "We could not isolate ourselves successfully from either one of them," he said, "even if this seemed desirable. Our commercial destiny is closely linked with both. This relationship is by no means a one-way street. The Canadian market is one of the largest import markets in the world, and Canada is the largest and most important customer for both the United States and the United Kingdom . . . In our own interest we must try to prevent these two great trading areas being divided into two separate and divergent groups. It must be our policy to keep the channels of finance and trade open between the sterling area and the dollar area. Our difficulty at the moment is to balance the trade of Canada with its two principal customers.

Better Depreciation Policy Would Aid Smaller Plants

In a symposium on limited production, at one of the key technical sessions of the ASTE program, E. P. Blanchard, director of sales for The Bullard Co., stressed the need for a more generous national policy with respect to depreciation and taxes, and pointed out that such a policy actually would provide greater economic benefits to smaller industrial plants than to the mass production plants.

"Under present day conditions," he said, "a progressive policy with regard to machine investment is a most important factor in national economy to support a standard of living that avoids political turmoil. There are real problems in many countries today where controlling policies have destroyed the incentive to invest in production equipment and to produce goods at a profit, and the national attitude is reduced to a mere dogged struggle for survival."

During the year ending Sept. 1, 1949, according to Mr. Howe, Canada sold to the United Kingdom goods valued at about $700 million, and imported from them goods to a value of $325 million. During the same year Canada sold to the United States goods to the value of $1550 million and imported from the United States goods to the value of about $2 billion. Obviously, he said, Canada must increase her imports from the United Kingdom to bring about a better balance between exports and imports.

"Our adverse trade balance with the United States represents a drain on our dollar resources that must be kept to manageable proportions," Mr. Howe said. "Either we must export more to the United States, or alternatively, buy less in that country. Of course we prefer an expansionist policy to a restrictive policy, in both cases."

***THE INDUSTRIAL EXPANSION** of Canada during the past decade was described by Hon. Clarence D. Howe, Canadian minister of trade and commerce, at banquet which climaxed ASTE meeting in Montreal. The meeting was directed by Robert B. Douglas (right) ASTE president, and Harry E. Conrad (left), executive secretary of the society*

Hot Machining Discussed

Of considerable interest on the ASTE program was a symposium on hot machining, at which papers prepared by A. O. Schmidt and J. R. Roubik of Kearney & Trecker Corp., and by Sam Tour, chairman of the board, Sam Tour & Co., Inc., were presented. Mr. Tour discussed experimental lathe turning operations conducted by his organization in cooperation with the U. S. Navy, in which both oxyacetylene torches and high-frequency induction coils were used to raise workpiece temperature at the surface to as much as 1800 F at the cutting position. Carbide-tipped lathe tools were used with electric strain gages to determine tool pressures resulting when turning heated and unheated shafts.

These studies showed turning rates could be increased about three times when turning steels under about 250 Brinell hardness, and about four or five times when turning harder steels with properly applied heating units and carbide-tipped tools. Even materials otherwise unmachinable have been turned readily when heated during the turning operation, according to Mr. Tour. Finish obtained is improved, power requirements are decreased, and proper controls keep heat from affecting physical properties of the finished pieces.

Milling of Heated Pieces

Slab and face milling of pieces heated in a furnace, or heated in place on the machine table with oxyacetylene torches while milling progresses, was described in the paper by Schmidt and Roubik. In Dr. Schmidt's absence on a European trip, the paper was delivered by Mr. Roubik.

Higher production rates, lowered tool wear and lowered power requirements were shown to justify the expense of heating the workpiece surfaces to about 1200 F to soften the top layer of the material and cushion the shock when the milling cutter enters the work. Cutters tipped with carbides and cast alloys proved suitable, since they have desired cutting qualities at elevated temperatures. Cutters must be designed for good chip flow and immediate ejection of the chip to avoid unnecessary accumulation of heat in the cutter. Down (climb) cutting was found more effective than conventional (up) cutting when using slab cutters. Application of the hot milling technique seems at present to be limited to operations that cannot be performed practically or economically by the more common methods.

Largest Known Deposit of Titanium in North Quebec

In reviewing Canada's resources, Clarence D. Howe, minister of trade and commerce, referred to the iron ore deposits on the boundary between Quebec and Labrador, and said that development of this iron deposit is closely linked up with the St. Lawrence Seaway. He pointed out that the Labrador ore possibilities may well turn the balance in favor of the rapid development of the Seaway. Mr. Howe also referred to new discoveries of petroleum and natural gas in Alberta and said that they promise to make that province the equal of Texas as a source of these products. He said the largest known deposit of titanium is in northern Quebec, and a refinery for this metal is being built near Montreal.

New Wage-Hour Law Stimulates Annual Plans

WASHINGTON—To stimulate annual wage plans, the new wage-hour amendments effective Jan. 25 give more liberal overtime concessions to employers who give workers annual wage assurances in a union contract.

The employer will be entitled to the overtime exemption up to 12 hr a day and 56 hr a week if his contract: (1) Guarantees employees at least 1840 hr or 46 weeks a year at the normal number of hours per week (not less than 30); (2) Limits the absolute number of hours a year for any employee to 2240; (3) Gives the employee time and a half overtime after 40 hr a week once the guaranteed time has been filled.

Also, if the employee actually works more than 2080 hr (the equivalent of 52 weeks at 40 hr each) he must be paid time and a half for all hours worked in excess of 2080. Absolute ceiling for the year is 2240 hr.

Advantage of the revised plan is that the employer suffers no retroactive overtime penalty if the guaranteed hours or the 2080 hr are exceeded. There is a leeway, up to 2240 hr, for which the employer only pays overtime on hours beyond 2080.

Rise in Tool, Die Business Indicated As Appliance Makers Change Models

NEW YORK—Two important factors which would indicate a rise in the tool and die business were pointed out by Centre W. Holmberg, new president of the National Tool & Die Manufacturers Association, here at the Statler Hotel Oct. 30-Nov. 2 for the annual convention.

In the increasing competition of the buyer's market, said Mr. Holmberg, who is president of Aug. W. Holmberg & Co., Inc., New York, new models of products, especially in the household appliance field, must be introduced soon. "This is impossible without the tailormade dies, molds and other special tools supplied by the tool and die industry."

Secondly, he added that "with a constantly growing pressure to reduce the cost of production, greater and greater dependence will be placed on a better and more elaborate tooling-up for the job." This, he emphasized, offers the most practical way of keeping costs down.

The recently issued NTDMA Directory of Special Tooling Services, which lists the products of 750 tool and die shops all over the country, has done much, Mr. Holmberg said, "to emphasize the importance of our industry, which, according to the new Census of Manufacturers, shipped $271 million of products in 1947."

Government Buying is Problem

Mr. Holmberg pointed out that one of the big problems facing NTDMA members was the method used by government procurement agencies. It is reported, he said, that many contracts are being awarded at prices that represent little more than the cost of the materials required. This means that instead of strengthening the economy of the country, such contracts bring losses to bidders who have made errors of judgment or computation. The association, Mr. Holmberg said, has urged that greater care be taken to make sure that jobs are awarded to responsible contractors, in the interest of all concerned.

Some 150 of the NTDMA's 500 members attended the convention, and heard talks by Paul R. Hatch, sales director, Brown & Sharpe Mfg. Co., Providence, R.I.; L. R. Boulware, vice president in charge of employee relations, General Electric Co., New York; Gene Flack, sales counsel and director of advertising, Sunshine Biscuits, Inc., Long Island City, N. Y.; and Dexter Keezer, director, economics dept., McGraw-Hill Publishing Co., New York.

Cooperative Selling Needed

The need for cooperative selling was stressed by Mr. Hatch. He said that most tool and die manufacturers have stressed engineering and manufacturing techniques when they should be strengthening their sales policies. He proposed a sales program for the NTDMA which would train sales personnel in the specific problems of selling tools and dies.

"Creative selling is the key to prosperity," stated Mr. Flack. In spite of pessimistic predictions, he said, "we must keep in mind that our national income, rate of employment and standard of living are higher than ever before. With more people and families, greater purchasing power and continued demand for goods, the job of selling today needs effort unweakened by pessimism."

Panel discussions were held at both general sessions of the convention, on "Business Problems of Tool & Die Manufacturers," and "Employer-Employee Relations."

Another highlight of the convention was the impressions of E. Slater, of Slater & Crabtree, Ltd., Wakefield, England, who compared the tool and die industries here and in England. American tool and die shops are "twenty years ahead" of comparable British shops, he said. However, the British are more advanced than American shops in export sales and in making tools for deep stamping.

Awards of merit were presented to J. J. Kohl, president, International Tool Co., Dayton, retiring president of the association; Jerome H. Stanek, vice president, Stanek Tool & Mfg. Co., Milwaukee, retiring secretary of NTDMA; and to Jack Kleinoder, secretary-treasurer of John Volkert Metal Stampings, Inc., New York.

***SAMUEL F. NEWMAN**, chairman, Landis Tool Co., Waynesboro, Pa., has completed 50 years of constant service in the machine tool industry. At a company dinner Oct. 28, he was given a leather-bound folder of congratulatory letters from prominent metalworking executives and machine tool builders. Mr. Newman joined Landis Tool Co. on Nov. 1, 1899. After serving the machinist apprenticeship, he joined W. H. Foster Co., Boston, in 1903. He returned to Landis Tool in 1904. In 1908 he left for Landis Machine Co., also in Waynesboro, where he stayed for 32 years, becoming vice president. In 1940 he rejoined Landis Tool as president and in 1948 was named board chairman. During this 50-year period Mr. Newman helped develop many of the major advances in thread cutting and grinding practices in common use today*

National Tool and Die Manufacturers Association Elects Leaders for 1950

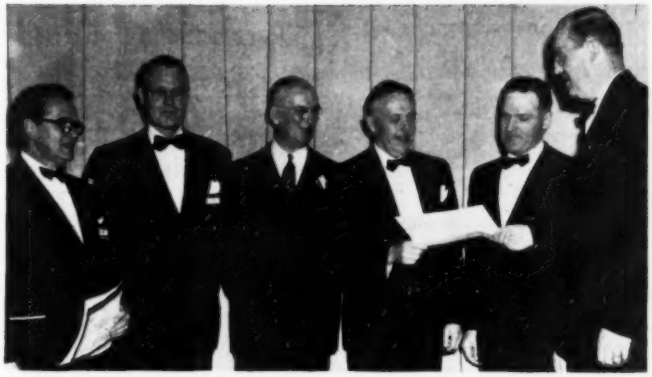
Centre W. Holmberg
President

Herbert F. Jahn
1st Vice President

R. H. Cope
2nd Vice President

Alfred Reinke
Secretary

Herbert Harig
Treasurer



***AN AMTDA SCENE** at the 25th anniversary dinner was the presentation of certificates to 22 founder companies. Here, left to right, are Arlington Neutzel of Blackman & Neutzel Machinery Co., St. Louis; O. W. Johaning of Colcord-Wright Machinery & Supply Co., St. Louis, the newly-elected president of AMTDA; T. C. Stephens of Robert R. Stephens Machinery Co., St. Louis; Frederick B. Scott of Syracuse Supply Co., Syracuse, N. Y.; Earl B. MacDonald, also of Syracuse Supply, newly-elected first vice president of AMTDA; and Robert L. Giebel of Giebel, Inc., New York, retiring president, presenting the certificates to founder companies*

Machine Tool Distributors Hear Taft Urge Faster Write-Off for Tax Aid

CINCINNATI—Speedier write-offs of new machine tools for tax purposes would be a boon to the machine tool industry and to machine tool users, said Senator Robert A. Taft of Ohio, at the 25th anniversary dinner of the American Machine Tool Distributors' Assn. at the Hotel Gibson, Oct. 31. The dinner was attended by 700 Association members, machine tool builders and their wives.

Senator Taft acknowledged the key position of the machine tool industry in the American economy and advocated economy in government spending and a minimum of controls on business and industry.

Presentation of certificates to representatives of the 22 founder companies of the AMTDA was a feature of the dinner at which the master of ceremonies was A. G. Bryant, president, Bryant Machinery & Engineering Co., Chicago, and vice president of Cleereman Machine Tool Co., Green Bay, Wisconsin.

O. W. Johaning, Colcord-Wright Machinery & Supply Co., St. Louis, was elected president of the Association. Other officers are E. B. McDonald, Syracuse Supply Co., Syracuse, N.Y., first vice president; E. J. Seifreat, Seifreat-Elstad Machinery Co., Dayton, Ohio, second vice president; George B. McClennen, Delta Equipment Co., Philadelphia, secretary-treasurer.

New Directors are E. R. Motch, Jr., Motch & Merryweather Machinery Co., Cleveland; Joseph F. Owens, Jr., J. F. Owens Machinery Co., Syracuse, N.Y.; Russell C. Niemeier, Barney Machinery Co. Inc., Pittsburgh, and Frank Armstrong, Federal Machinery Co., Chicago.

Distributors know how to sell the mechanical men, and now must learn how to sell the men who hold the purse strings, according to Robert L. Giebel, Giebel Inc., New York City, retiring AMTDA president, who presided at all sessions. To convince these men, distributors need the best salesmen possible who know something about finance, economics and long-range planning as well as about machine shop practice.

Mr. Giebel believes it essential for distributors to strive for quality rather than quantity in their sales force. "The day is gone when we can put a brief case in the hands of a good scout and call him a machine tool salesman," he said. He made a plea that, "In the tough times ahead, we do not scatter our high ethics to the four winds."

Educational Job Needed

The machine tool industry should do an educational job on users of its products to convince them of the benefits to be derived from accelerated depreciation of new machine tools for tax purposes, Mr. Bryant declared. He asserted that a change in depreciation policy will not occur until Congress takes action.

The implications for machine tool distributors arising from the Supreme Court's ruling in the Standard Oil of California case were pointed out by Tell Berna, general manager, National Machine Tool Builders' Association. This case was concerned with the granting of exclusive selling rights to certain filling station dealers. Mr. Berna also explained the J.I.C. (Joint Industry Council) standards for machine tools sponsored by automobile companies. The new standards, with some modifications, now are in the process of adoption.

Plans are in motion to hold a sales course for machine tool salesmen in Denver next spring, said Mr. Seifreat, reporting as chairman of the Association's sales and service committee. The course would be similar to those conducted the past summer at four universities and would be designed for salesmen from the Pacific Coast, Rocky Mountain and Southwestern regions.

Advertising does for the salesman what the automatic machine does for the skilled workman on the production line, William K. Beard, vice president, McGraw-Hill Publishing Co., Inc., New York, said. He told how advertising mechanizes selling and aids the salesman by preparing the way for him to close an order.

6000 Expected At ASME Meeting

NEW YORK—With more than 270 speakers drawn from university, laboratory and every phase of industry scheduled to deliver some 200 papers, the 70th annual meeting of the American Society of Mechanical Engineers here at the Statler Hotel, Nov. 28-Dec. 2, will be one of the most comprehensive ever offered by the society. It is expected that the meeting will attract 6000 engineers.

Fields to be covered are: power, aviation, applied mechanics, fuels, gas turbines, heat transfer, hydraulics, industrial instruments and regulators, machine design, management, materials handling, metals engineering, oil and gas power, process industries, production engineering, railroad, rubber and plastics, textile, wood industries, petroleum.

Speakers during the various luncheon, dinner and technical sessions will include Dan A. Kimball, under secretary of the Navy; Cornelius Vanderbilt Whitney, assistant secretary of the Air Force; Dr. H. J. Gough, president, Institution of Mechanical Engineers of Great Britain; Tell Berna, general manager, National Machine Tool Builders Assn.; R. C. Sollenberger, executive secretary, Conveyor Equipment Manufacturers Assn.; Frederick S. Blackall, Jr., president and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I.

Detroit

SETTLEMENT OF STRIKE NO SPUR TO IMMEDIATE AUTO OUTPUT

1929 RECORD PASSED . . . CHRYSLER, FORD DEVELOP NEW ENGINES

Settlement of the steel strike will have no immediate affect, so far as the automobile industry is concerned. That is, there will be no immediate resumption of throttled-down assembly lines, simply because the blast furnaces are operating once again.

This is true for reasons which are quite evident to the purchasing departments of the car makers and the sales departments of the steel companies. Automobiles and trucks require a broad product mix—not simply one or two specifications and one or two sizes or shapes. Steel mills run their products in batches—so many tons of requirement A, then so many of requirement B, and so on.

If an auto company is superlatively lucky, all the types of steel on which it ran short during the mill tieup will be at the head of the production line. More likely, though, is that the varied requirements will be spotted here and there through the melting and rolling schedules. A few weeks of steel mill operations may be necessary, perhaps even more, before any individual car maker can expect its full complement of needs. One estimate was that as much as six weeks might be needed.

The effect of the steel strike, therefore, is to cut into output for periods well beyond the actual term of the tieup.

Chrysler First Major Shutdown

The first major plants scheduled for shutdown included those of Chrysler Corp. Their date: Nov. 4, except for Plymouth, which may be able to keep going a fortnight or more longer. Most Ford operations, including all assembly, were to stop Nov. 11. General Motors, perking along on four-day schedules, expected to be able to maintain itself through most of this month. Independents were at varying stages.

Up through the first part of November the steel strike had not hurt any of the automobile companies. Cars of all makes were generally available at dealer points. The options on color and body type available during October were rapidly reducing, but no potential purchaser was being deprived of the chance of parting with his money because there was no merchandise close to what he wanted.

In other words, the effect of the steel strike up to Nov. 10 or so was simply to whittle down inventories of completed cars in the field. Any inventory reduction of this sort at the start of the winter season is an undiluted satisfaction to the manufacturers. Beyond the point where inventories are eliminated, of course, is a wholly different matter.

Production at the turn into November was softening rapidly from the 150,000-a-week clip maintained in October. The first November week saw produced about 115,000 or so. The second week could be expected to reflect a fall in that figure to less than 100,000. By the third week the total seems to be headed way down, to a maximum of 40,000 or so.

In spite of this abrupt tailspin, the industry has done something this year it hasn't been able to do since 1929—set a new production record. In 1929 U.S. and Canadian plants built 5,621,045 cars and trucks. By the end of Octobe - that record had been beaten, with approximately 5,700,000 units. Whatever output comes in November and December will further eclipse the 20-year-old mark.

It might be added, in a parenthetical sort of way, that not even the brightest optimists in the auto industry expect that 1950 will see the 1949 output levels maintained. Production record-breaking has had its day for a good round period ahead.

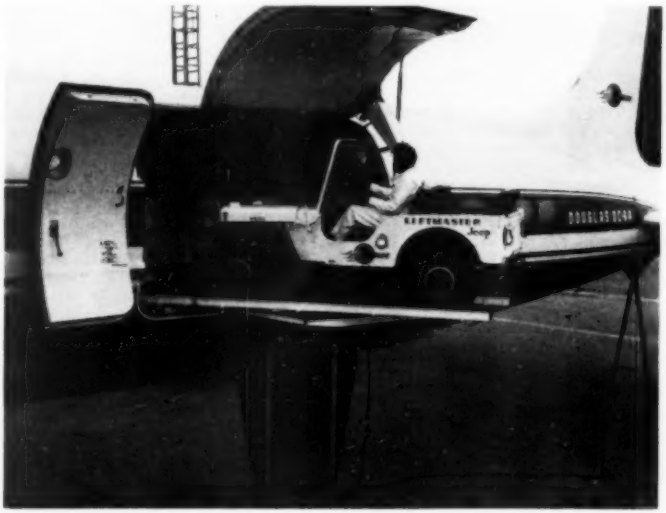
But the companies are not relaxing in their efforts to whet the buying appetites. Chrysler, for example, has a large-scale engine development program under way which might see daylight for the 1951 models.

V-8 engines have been prototyped, and prints on machine tool requirements are in the hands of builders. The rub is that the prints are out for estimating only, not for proposals with a definite time on delivery. Chrysler development people have not yet been given a go-ahead for tooling the new powerplants, nor do they have any idea when they will get one. Accordingly, the quotations are lagging, and the interest is not as high as it might otherwise be.

All the same, these are substantial programs, and they will eventually come to pass. They call for the usual broad range of equipment needed in any engine plant, with the normal postwar emphasis on transfer type machines. The products will be in the higher ratios above 7-to-1.

New Ford Engine Planned

Ford, too, has a new engine in development, but it is even farther away from tooling than the Chrysler projects. The Ford unit also reaches into the higher compression ratio ranges. As yet there are no prints on this particular job out, but its existence is known, as well as the information that it is definitely closer to quotation than the run of experimental projects always found in the Ford—and the other—shops.



***A JEEP AND ITS DRIVER** are handled easily by a 4000-lb capacity power elevator which is a feature of the new Douglas DC-6A Liftmaster, long-range commercial cargo transport. Special adapter allows Jeep to drive aboard truck-bed level of elevator, which may be used on either door*

Names in the News

Samuel P. Crago

Samuel P. Crago, materials manager in the production dept. of Hamilton Standard Div., United Aircraft Corp., East Hartford, Conn., has been named assistant factory manager, succeeding **Nevin F. Decker,** who resigned the post due to ill health. Mr. Crago joined Hamilton Standard as assistant sales manager in 1939. In his new post he will retain the duties of materials manager.

John S. Tawresey, formerly vice president in charge of engineering at Bunting Brass & Bronze Co., Toledo, has joined Barden Corp., Danbury, Conn.

C. Coyle Smith, manager of the projects planning and research dept. of Willys-Overland Motors, Inc., Toledo, has been named assistant to the first vice president. He succeeds **Robert Montgomery,** who has been named general parts manager.

Curtis D. Cummings has been named sales manager of Allison Co., Bridgeport, Conn. He was associated with SKF Industries, Inc., for twelve years, and during the war was a consultant in the bearings branch of the Tools Div., War Production Board.

Curtis D. Cummings

Elden L. Auker has been named assistant district manager in the Michigan area for Bay State Abrasive Products Co., Westboro, Mass.

H. Edward Neale has been named Chicago direct representative, working in conjunction with Marshall & Huschart Machinery Co., for the Bullard Co., Bridgeport, Conn.

J. W. Morgan has been named assistant sales manager, eastern sales division, of Hyster Co., Portland, Ore. He will be in charge of tractor equipment sales activities and will be located at the Peoria, Ill., plant.

Alexander H. D'Arcambal, vice president and sales manager, small tool and gage division, and consulting metallurgist of Pratt & Whitney division, Niles-Bement-Pond Co., West Hartford, Conn., recently observed his 30th anniversary with the company.

Harry Emerson Sloan, president and treasurer of Cushman Chuck Co., Hartford, Conn., celebrated the 50th anniversary of his business life with the company last month. His activities began in the manufacturing dept. and progressed through engineering and executive phases of the business.

David Neill has been appointed Cincinnati sales representative for Farrel-Birmingham Co., Inc., Ansonia, Conn. He joined the F-B sales dept. in 1945 after three years in the company's gear manufacturing div.

Robert Krepps has been named district sales supervisor in the Midwest area for Denison Engineering Co., Columbus, Ohio. He will be headquartered in Chicago. His new work will include the sales supervision of the control and Multipress divisions.

S. J. Woodworth has been named sales manager of the Wright hoist division of American Chain & Cable Co., Inc., Bridgeport, Conn., with headquarters at York, Pa. He succeeds **A. R. Haskins,** resigned. **J. F. Hawkins has been named district** sales manager of the Detroit territory of the Page steel and wire division.

Ray L. Morrison has been elected to the newly created post of executive vice president of DeVilbiss Co., Toledo. He came to DeVilbiss from Timken-Detroit Axle Co. where he was general manager of the brake division. For the previous ten years he was vice president and general manager of Bendix-Westinghouse in Pittsburgh and Elyria.

B. A. Bannan

B. A. Bannan, vice president and manager of Western Gear Works, Lynwood, Calif., has been named general manager of Western Gear and its affiliated plants.

Obituaries

Dr. Georg Schlesinger

Dr. Georg Schlesinger, 76, died Oct. 6, in England. For 30 years he was professor of machine tools and plant administration, and director of research on machine tools and scientific management at Charlottenburg, Berlin. He created a laboratory for investigation of machine tools at Brussels University, and organized the research dept. of the Institution of Production Engineers at Loughborough, England. He retired in 1944 to become a consultant.

Aaron J. Jennings, 54, vice president of Cleveland Worm & Gear Co., died Oct. 30. He had been associated with the firm for more than ten years.

Harry P. Jenson, 64, assistant manager of sales and export sales manager of Cleveland Twist Drill Co., where he had worked since 1905, died Oct. 17.

***INDUSTRIAL RELATIONS** achievement award of the National Metal Trades Assn. was given to Louis Ruthenberg, chairman, Servel, Inc., at the Association's golden anniversary convention*

Standards Studied at Meeting of American Gear Manufacturers

CHICAGO — Approximately 150 members and 50 wives attended the 1949 semi-annual meeting of the American Gear Manufacturers Assn. at the Edgewater Beach Hotel here Oct. 24-26. Sessions followed the usual pattern, beginning with an officers' reception Oct. 23.

Dexter Keezer, director of the economics dept., McGraw-Hill Publishing Co., New York, spoke at the luncheon Oct. 24, and Warren Whitney of Birmingham, Ala., at the dinner the following night.

Several new committees were formed, including utility gearing, mill gearing, educational information, gear blank proportions, and aircraft gearing. Some 14 engineering committee meetings were held.

The standard on spur-gear practice (220.01) has been reviewed and some changes are to be incorporated. The automotive gearing committee will prepare a history of the evolution of this specialized type. An enclosed worm gear rating standard is under consideration, and a standard on single-thread hobs (1 to 19 DP), No. 121.01, will be ready for the next annual meeting. Multi-thread hobs will be the next project for this particular committee.

Four fine-pitch standards have already been turned over to the ASA for acceptance and a fifth is soon to go. New spline standards are being well received; no straight-sided spline standard is planned.

Lapping-Practice Chart

The lubrication committee has worked out a lapping-practice chart. The enclosed gear drives committee has approved tentative standards on applications of bevel gears (150.01), allowable torsional and bending stresses in shafting (260.01), bolting (255.01) and recommended the bevel-worm standard (430.01) to the executive committee.

The commercial committee on open gearing has developed weight charts for gear blanks, which have been turned over to the gear proportioning committee for coordination with proportions. The former committee is now undertaking a preliminary costing study on work involving tooth cutting or gear forming and cutting. The enclosed gear drive committee has developed ratings for quadruple gearmotors (only two makers) and a standard on speed-reducer ratios. A thermal ratings study will take about two years. Tentative standards on bearing and bolting practices have been written.

Two Papers Presented

Two papers were presented during the meeting. One on "Gear Testing Methods for the Development of Heavy-duty Gearing," by R. P. Van Zandt and B. W. Kelley of Caterpillar Tractor Co., was previously an SAE paper. The other, by A. D. Moncrief, assistant chief engineer of Michigan Tool Co., discussed "Pre-Shave Cutting Tools." Primarily a "slide and discussion" paper, it was distinctive for the application of a relatively new technique utilizing a film-transparency projector, with which the author could handle his own slides, pencil in development of elements, and use overlays to show fits and progressive steps. Both papers are available from AGMA.

Executives Polled at Metal Trades Convention Optimistic About 1950

CHICAGO—An optimistic view of prospects for 1950 in the metal trades industries, despite concern over the steel and coal strikes, was expressed by 40 business leaders, in a poll at the National Metal Trades Assn. convention held here Oct. 25-28.

The majority polled said they believed business would range from "fair" to "good." Only one thought conditions would be "excellent," while one other was pessimistic enough to report "poor." However, the vote was almost two to one against production employment equalling that of 1949.

A feature of the convention was a series of conferences on collective bargaining.

Industry-Wide Bargaining Hit

NMTA President Thomas J. Morton, Jr., head of Hoosier Cardinal Corp., Evansville, Ind., assailed the spread of industry-wide bargaining as a Frankenstein monster which eventually will destroy its creators and wreak havoc with both industry and labor.

"If we are to continue to have collective bargaining in this country," he declared, "it must be free and untrammeled and at the individual plant level. It cannot be coercive, 'shot-gun' or so-called 'pattern' or industry-wide bargaining. Neither should it take the color of alleged bargaining through the use of governmental boards or because of political expediency."

The specter of bankruptcy faces small and medium-sized businesses which accede to demands for "fringe" and other non-productive items that may be absorbed by larger institutions, he maintained. He called upon every businessman to "take stock" and determine the point beyond which he cannot go.

Urges Informed Employees

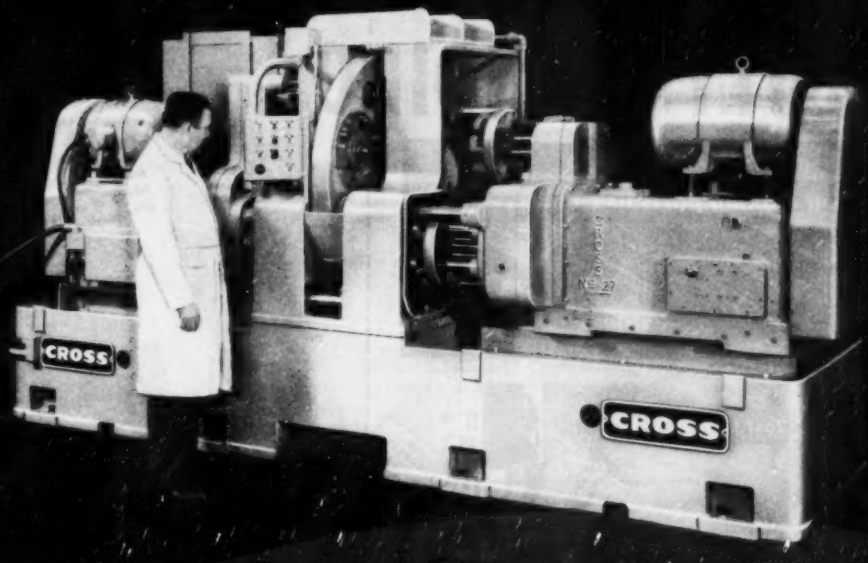
Employees well informed about their plant and its operations are less likely to make unreasonable and economically unsound demands, Walter S. Roach, vice president of the Flxible Co., Loudonville, Ohio, told the 1000 industrialists attending the convention.

"It is a well known fact," he stated, "that all of us fear or resent those things about which we are uninformed and which we therefore do not understand. This is true of employees, and it is particularly serious when this lack of knowledge and understanding in industry is deliberately increased and aggravated through misinformation spread by those who would exploit labor-management relations for their own benefit.

Seminar on Standards Slated

NEW YORK—Another private five-day seminar on principles and techniques of organizing company standardization work and the formulation of standard specifications will be held Jan. 23-27 by Dr. John Gaillard of the American Standards Assn. and lecturer in industrial standardization at Columbia University. The seminar will be held in Room 501-A, Engineering Societies Bldg., New York. Previous seminars, held since June, 1947, have been well attended. For registration details, write Dr. Gaillard, 400 W. 118 St., New York.

Another Special by Cross



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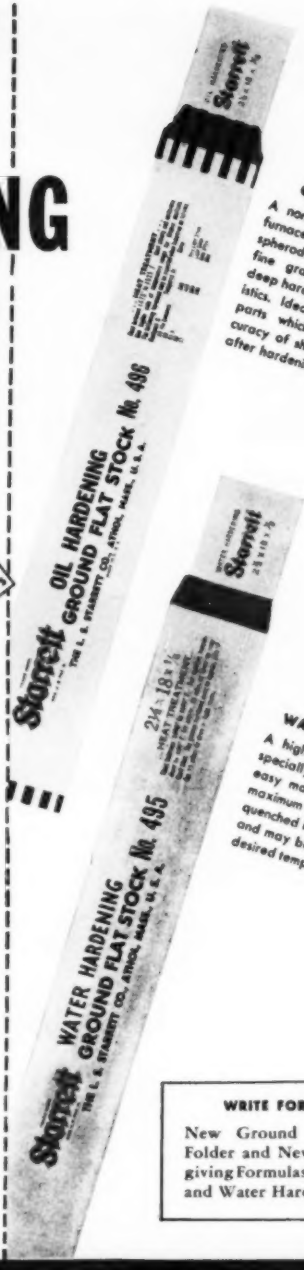
STARRETT Precision Ground Flat Stock is high grade annealed tool steel cut lengthwise from the sheet and ground to within .001" in thickness, 18-inch lengths, widths from ½ to 6 inches, thicknesses from 1/64" to 1" and more. Each piece individually wrapped and marked with size, type and heat treating instructions.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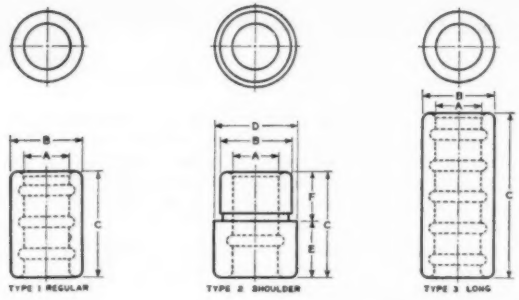
Punch and Die Sets... III



Source: A proposed American Standard published by the American Society of Mechanical Engineers

Guidepost Bushings

Size	Series	Type	Material	Inside Diameter A		Outside Diameter B			Overall Length	Shoulder		End to Shoulder	Oil Grooves	
										Length	Diameter		End to Groove	Groove Spacing
				Max	Min	Nominal	Max	Min	C	E	D	F		
½	Regular	1	Steel	0.5001	0.4999	....	0.8142	0.8138	1 ½	....	....	....	5/16	7/16
		3	Steel	0.5001	0.4999	....	0.8142	0.8138	3	....	....	....	5/16	7/16
⅝	Regular	1	Steel	0.6251	0.6249	....	1.0017	1.0013	1 ½	....	....	....	5/16	7/16
		3	Steel	0.6251	0.6249	....	1.0017	1.0013	3	....	....	....	5/16	9/16
¾	Regular	1	Steel	0.7501	0.7499	....	1.1272	1.1268	1 ¾	....	....	....	5/16	7/16
		2	Steel	0.7501	0.7499	....	1.1272	1.1268	2 ¼	....	1 5/16	....	5/16	9/16
		3	Steel	0.7501	0.7499	....	1.1272	1.1268	3	....	....	....	5/16	9/16
⅞	Regular	1	Steel	0.8751	0.8749	1 ⅜	1.3772	1.3768	1 ¾	....	....	....	5/16	9/16
		2	Steel	0.8751	0.8749	1 ⅜	1.3772	1.3768	2 ½	1.266	1 9/16	1.234	5/16	5/8
				0.8751	0.8749	1 ⅜	1.3772	1.3768	2 ½	1.516	1 9/16	0.984	5/16	7/8
		3	Steel	0.8751	0.8749	1 ⅜	1.3772	1.3768	3	....	....	....	5/16	9/16
1	Regular	1	Steel	1.0001	0.9999	1 ½	1.5022	1.5018	1 ¾	....	....	....	5/16	9/16
		2	Steel	1.0001	0.9999	1 ½	1.5022	1.5018	2 ½	1.266	1 11/16	1.234	5/16	5/8
		3	Steel	1.0001	0.9999	1 ½	1.5022	1.5018	3	....	....	....	5/16	9/16
1 ⅛	Regular	1	Steel	1.1251	1.1249	1 ⅝	1.6272	1.6268	2	....	....	....	3/8	5/8
		2	Steel	1.1251	1.1249	1 ⅝	1.6272	1.6268	2 ¾	1.391	1 13/16	1.359	3/8	11/16
				1.1251	1.1249	1 ⅝	1.6272	1.6268	2 ½	1.266	1 13/16	1.234	5/16	5/8
		3	Steel	1.1251	1.1249	1 ⅝	1.6272	1.6268	3	....	....	....	5/16	9/16
1 ¼	Regular	1	Steel	1.2501	1.2499	1 ¾	1.7522	1.7518	2	....	....	....	3/8	5/8
		2	Steel	1.2501	1.2499	1 ¾	1.7522	1.7518	3	1.516	1 15/16	1.484	3/8	5/8
				1.2501	1.2499	1 ¾	1.7522	1.7518	2 ¾	1.391	1 15/16	1.359	3/8	11/16
		3	Steel	1.2501	1.2499	1 ¾	1.7522	1.7518	3	....	....	....	3/8	9/16
1 ½	Regular	1	Steel	1.5001	1.4999	2	2.0027	2.0023	2	....	....	....	3/8	5/8
		2	Steel	1.5001	1.4999	2	2.0027	2.0023	3	1.516	2 5/16	1.484	3/8	5/8
		3	Steel	1.5001	1.4999	2	2.0027	2.0023	3	....	....	....	3/8	9/16
1 ¾	Regular	3	Steel	1.7501	1.7499	2 ¼	2.2529	2.2525	3	....	....	....	3/8	9/16
		2	Steel	1.7501	1.7499	2 ¼	2.2529	2.2525	3 15/32	1 ½	2 ½	1 31/32	1	2
2	Regular	3	Steel	2.0023	2.0020	2 ½	2.5032	2.5028	3	....	....	....	3/8	9/16
		2	Steel	2.0023	2.0020	2 ½	2.5032	2.5028	3 15/32	1 ½	3 ⅛	1 31/32	1	2
2 ½	Regular	3	Steel	2.5028	2.5025	3	3.0035	3.0031	3	....	....	....	3/8	9/16
		2	Steel	2.5030	2.5025	3	3.0035	3.0031	3 31/32	2	3 ⅝	1 31/32	1	2
3	Regular	2	Steel	3.0030	3.0025	3 ⅝	3.6290	3.6285	3 31/32	2	4 ⅛	1 31/32	1	2

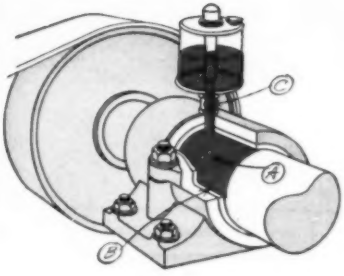
All dimensions are given in inches.

GENERAL: The inside diameter and outside diameter shall be gound or lapped to the dimensions shown in the table. Generally bushings up to 1 3/4 inside diameter are lapped and all outside diameters and the larger inside diameters are ground.

MATERIAL: This standard does not specify material for guidepost bushings. They are generally made from X1314 steel or equivalent, heat treated Rockwell C-62 to C-65.

NOTE: Oil grooves may be omitted if provided in the guideposts.

Case 1162—Keeping Oil on Heavy-Duty Bearing Surfaces



SHAFT BEARING

Adhesive Calol Vistac Oil reduced oil consumption and wear on bearings operated under constant heavy shock loads. Recommended for all plain bearings, table slides, air tools and enclosed industrial reduction gear sets. Comes in six grades: 9X, 14X, 19X, 28X, 36X, 45X — SAE 10 to SAE 50.

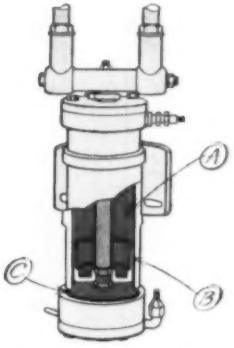
A. Extremely viscous and tacky and sticks tight under pounding — prevents metal-to-metal contact and reduces leakage waste.

B. Contains extreme pressure stringiness and oiliness additives . . . tough lubricating film remains intact in wide range of temperature conditions.

C. Small quantity provides adequate lubrication.

Calol Vistac Oil may be applied by forced feed, gravity, and sight-feed cup lubricators; the lighter grades by wick- and ring-oilers.

Case 1148A—Eliminating Deposits in Hydraulic Systems



MACHINE TOOL HYDRAULIC-FEED CYLINDER

Calol OC Turbine Oil, as the hydraulic medium in machine tool feeds, and lifts, will not deteriorate. In use as long as four years, it was only necessary to replace oil lost by leakage. Also recommended for steam turbines. Comes in four grades: 9, 11, 15, 19.

A. Contains very effective oxidation inhibitor — will not form deposits . . . same charge has been used in turbine as long as four years without trace of acidity.

B. High metal-wetting ability and corrosion inhibitor prevents rusting and pitting.

C. Separates readily from water or other contaminants — dirty oil may be reclaimed easily.

In turbines, the corrosion inhibitor in Calol OC Turbine Oil assures protection against rusting even during the critical initial operating period.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street, San Francisco 20, California

The California Oil Company
Barber, New Jersey

The California Company
17th and Stout Streets, Denver 1, Colo.

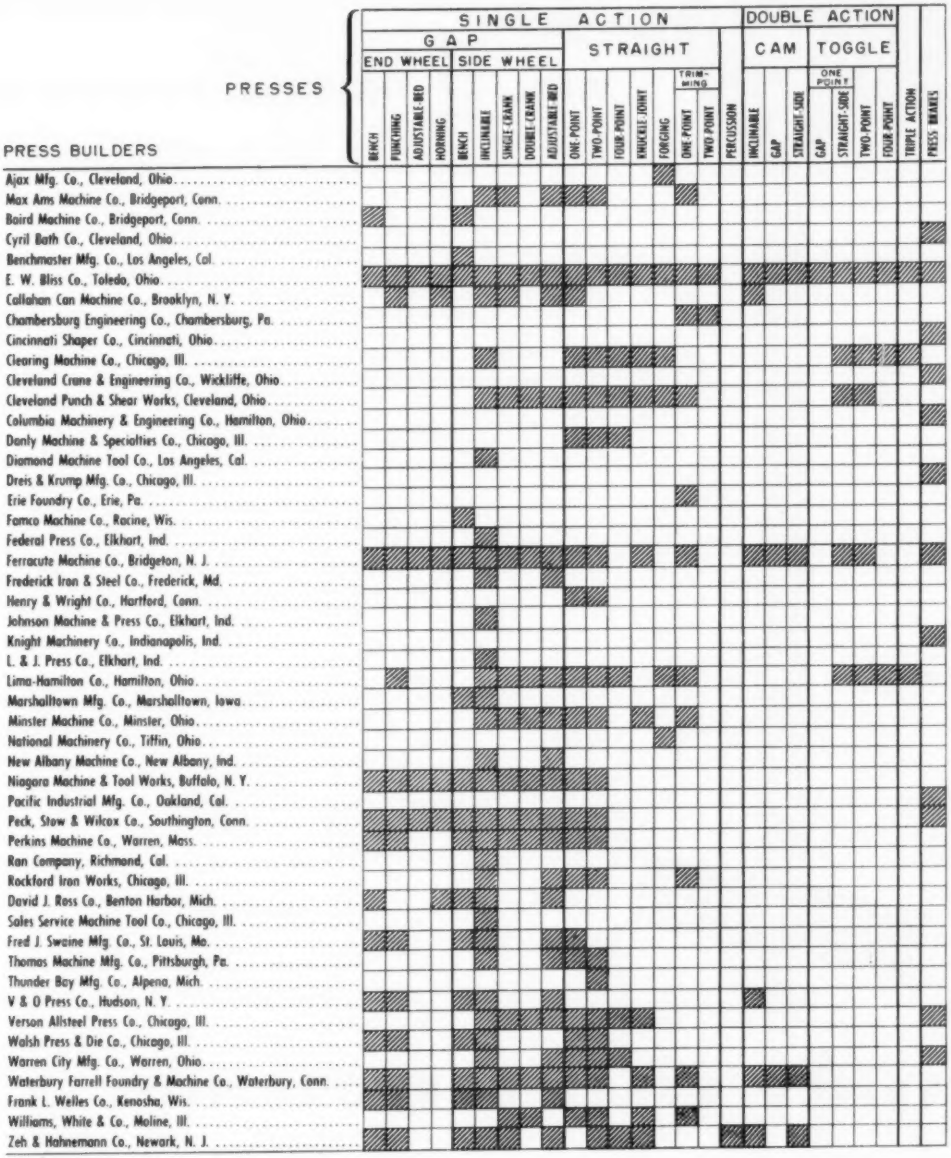
Standard Oil Company of Texas
El Paso, Texas

CALOL

Trademark Reg. U.S. Pat. Office

Sources of Mechanical Power Presses

BY SERGIUS D. BROOTZKOOS


PRESSES
PRESS BUILDERS
SINGLE ACTION
GAP
END WHEEL
BENCH
PUNCHING
ADJUSTABLE BED
HORNING
SIDE WHEEL
BENCH
INCLINABLE
SINGLE CRANK
DOUBLE CRANK
ADJUSTABLE BED
STRAIGHT
ONE POINT
TWO POINT
FOUR POINT
KNUCKLE JOINT
FORGING
TRIM-MING
ONE POINT
TWO POINT
PERCUSSION
DOUBLE ACTION
CAM
INCLINABLE
GAP
STRAIGHT SIDE
TOGGLE
ONE POINT
GAP
STRAIGHT-SIDE
TWO POINT
FOUR POINT
TRIPLE ACTION
PRESS BRAKES
Ajax Mfg. Co., Cleveland, Ohio
Max Ams Machine Co., Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Cyril Bath Co., Cleveland, Ohio
Benchmaster Mfg. Co., Los Angeles, Cal.
E. W. Bliss Co., Toledo, Ohio
Callahan Can Machine Co., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cincinnati Shaper Co., Cincinnati, Ohio
Clearing Machine Co., Chicago, Ill.
Cleveland Crane & Engineering Co., Wickliffe, Ohio
Cleveland Punch & Shear Works, Cleveland, Ohio
Columbia Machinery & Engineering Co., Hamilton, Ohio
Danly Machine & Specialties Co., Chicago, Ill.
Diamond Machine Tool Co., Los Angeles, Cal.
Dreis & Krump Mfg. Co., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Famco Machine Co., Racine, Wis.
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Frederick Iron & Steel Co., Frederick, Md.
Henry & Wright Co., Hartford, Conn.
Johnson Machine & Press Co., Elkhart, Ind.
Knight Machinery Co., Indianapolis, Ind.
L. & J. Press Co., Elkhart, Ind.
Lima-Hamilton Co., Hamilton, Ohio
Marshalltown Mfg. Co., Marshalltown, Iowa
Minster Machine Co., Minster, Ohio
National Machinery Co., Tiffin, Ohio
New Albany Machine Co., New Albany, Ind.
Niagara Machine & Tool Works, Buffalo, N. Y.
Pacific Industrial Mfg. Co., Oakland, Cal.
Peck, Stow & Wilcox Co., Southington, Conn.
Perkins Machine Co., Warren, Mass.
Ran Company, Richmond, Cal.
Rockford Iron Works, Chicago, Ill.
David J. Ross Co., Benton Harbor, Mich.
Sales Service Machine Tool Co., Chicago, Ill.
Fred J. Swaine Mfg. Co., St. Louis, Mo.
Thomas Machine Mfg. Co., Pittsburgh, Pa.
Thunder Bay Mfg. Co., Alpena, Mich.
V & O Press Co., Hudson, N. Y.
Verson Allsteel Press Co., Chicago, Ill.
Walsh Press & Die Co., Chicago, Ill.
Warren City Mfg. Co., Warren, Ohio
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.
Frank L. Welles Co., Kenosha, Wis.
Williams, White & Co., Moline, Ill.
Zeh & Hahnemann Co., Newark, N. J.

Valve stem forged and machined from new Armco 17-4 PH Stainless Steel.

Here's A New Stainless Bar Grade

WITH 8 UNUSUAL ADVANTAGES

If your products require extra strength and hardness *combined with excellent corrosion resistance*, you'll be interested in the revolutionary new properties of Armco 17-4 PH Stainless Steel bars and wire.

This new precipitation hardening grade, a development of Armco Research, offers you an exceptional combination of 8 advantages:

1. It is hardenable by heat treatment to Rockwell C-40/45.
2. This hardness is obtained by heat treating in the *low range* of 850-900° F. for one hour, and air cooling.
3. Only a superficial, easy-to-remove heat tint results from the heating operation. This means that close tolerance parts can be finish-machined before hardening—eliminating finish machining or grinding after hardening.
4. Because of low hardening temperatures, distortion is virtually eliminated.
5. Freedom from hardening cracks.
6. Stress relieving treatment is not needed with Armco 17-4 PH Stainless Steel.
7. Machinability is good (between Types 302 and 303) in the annealed condition; fair when the steel is fully hardened. It can be readily hot worked and has good welding properties.
8. Its corrosion resistance is close to that of Types 302, 303, and 304.

Armco 17-4 PH may be just the stainless steel you need for better product performance or to solve special fabricating problems. For complete information, just fill in and mail the handy coupon. Armco Steel Corporation, 4169 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION.

MAIL TODAY FOR MORE DATA

Armco Steel Corporation, 4169 Curtis Street, Middletown, Ohio

Send me complete information on Armco 17-4 PH.

NAME_____ TITLE_____

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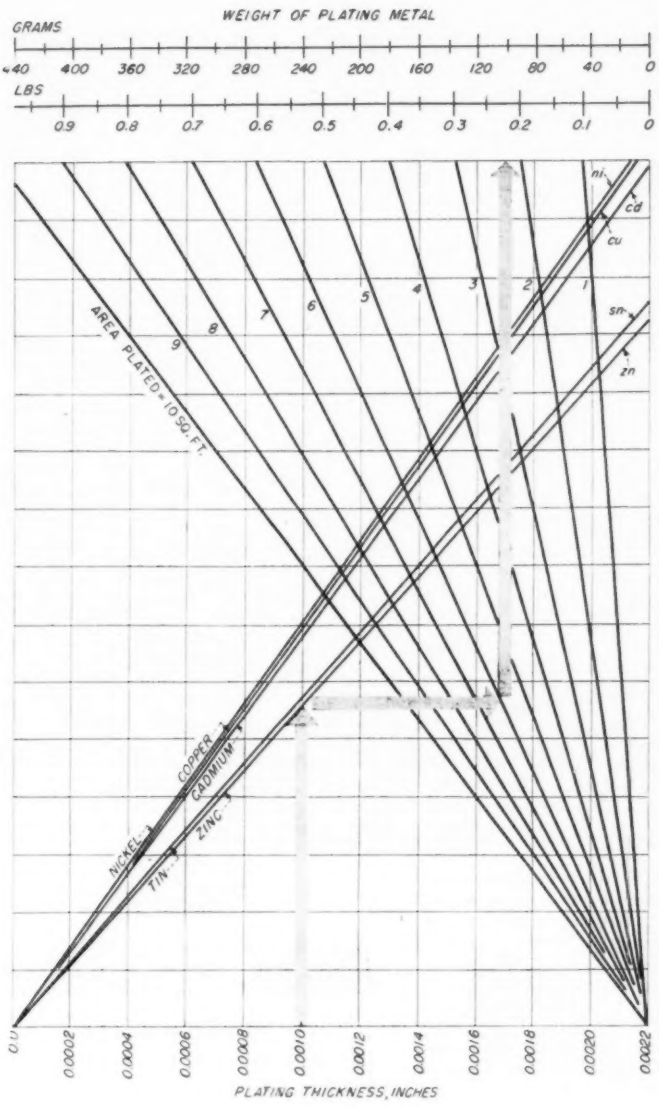
CITY_____ ZONE_____ STATE_____

ARMCO STEEL CORPORATION

ARMCO

Estimating Plating Finish Weight

BY TYLER G. HICKS



OFTEN during plating of parts, an estimate of the weight of metal to plate a given area is needed. The accompanying chart permits quick solution of this problem for five common plating metals. Use it thus:

Example 1: How much zinc is required to put a 0.0010-in. finish on an area of 6 sq ft?

Solution: Enter the bottom of the chart at a plating thickness of 0.0010 in. and project vertically to the curve marked "Zinc." From the intersection, move right to the 6-sq ft area curve, and then move vertically, to read 0.23 lb. or about 104 grams.

This is the most common type of problem encountered in metal finishing. But, there are occasions when the plater has a given weight of metal and wants to know what thickness of finish he can produce on a given area. Solution of this problem is:

Example 2: A plater has 0.40 lb of cadmium with which to finish 8 sq ft of surface. What thickness of cadmium plate can he obtain?

Solution: Enter the top of the chart at 0.4 lb and project down until the 8-sq ft area curve is intersected. From here project horizontally to the cadmium curve and then drop vertically to read about 0.0011 in. plating thickness.

Both problems have neglected losses in "stub" anodes and other reactions in the plating bath. In general, when insoluble anodes are used, corrosion losses can be neglected unless past experience under similar plating conditions shows that they must be considered. With soluble anodes immersed in an electrolyte containing ions of the plating metal, anode losses depend upon conditions in the bath. As a result, correction factors must be based on conditions.

Derivation

This chart is based on the relation,

Plating metal weight = Area plated, sq in. × Plating thickness, in. ÷ Plating metal density, lb/cu in.

The following densities have been used for determining plating weight: Cadmium, 0.313 lb/cu in. and 8.65 gm/cc; Copper, 0.324 lb/cu in. and 8.96 gm/cc; Nickel, 0.322 lb/cu in. and 8.90 gm/cc; Tin, 0.264 lb/cu in. and 7.298 gm/cc; Zinc, 0.258 lb/cu in. and 7.133 gm/cc.

These are the standard values as used at present by electroplaters.

BETTER MACHINES *mean* GREATER EFFICIENCY AND HIGHER QUALITY

NEW BRITAIN MULTIPLE SPINDLE SCREW MACHINES PICTURED IN BURROUGHS 1948 ANNUAL REPORT AS PART OF THE COMPANY'S IMPROVEMENT PROGRAM.

In 1947 and 1948 Burroughs Adding Machine Company reinvested a substantial part of its earnings in major equipment, including some New Britain Automatics. The results of this reinvestment policy were higher quality of product, greater efficiency and better working conditions.

New Britains' high productive capacity makes them the world's safest investment. Those who fail to make the investment take the risk by endangering their ability to compete. May we send you "IT CAN BE DONE," a brochure of actual histories which includes detailed information on the work New Britains are doing for leading manufacturers?

THE NEW BRITAIN MACHINE CO. NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

TALKING SHOP

Manhandling

MAJOR PRESENT potential savings are in better utilization of manpower rather than in better manufacturing methods, as we've said before. Hence current emphasis in Detroit is toward automation of machines and between machines, better packaging and storage, palletization and similar steps —all to decrease manhandling.

Cybernetics

THIS QUEER WORD means the science of developing "thinking" machines—the elaborate calculators now in use, ranging from the aircraft balance computer to the Eniac machine.

Evolution

REVOLUTIONARY CHANGES in metal-cutting practice are infrequent. One expert explains this by saying that machine tools develop by *evolution* rather than *revolution*. The major exception we think of is the potential shift to higher surface speeds. If we go as high as some research indicates possible, it will definitely be revolutionary—in tools, in coolants and in possible surface finishes.

Automatized Welding

ONE LARGE AUTO-MAKER has been emphasizing automatic rather than hand welding, to save time and cost and to improve quality. Present trends are toward ultra-speed units, the multi-transformer method, and "poke" spot welding. Some multi-transformers supply as many as 130 guns . . . Because control is less critical, 3-phase dry-disk rectifier welders are preferred here . . . Instead of moving parts from one welder to another, the line is set up just like a machining line, and welding presses (often 4-column hydraulic units in which gun positions can be changed) are frequently right in the press line, with automatic feeds and ejectors between.

Electronic controls are commonly used to attain uniform weld quality. . . . Submerged arc is employed for heavy sections like rear-axle housings and clutch and brake pedals . . . Shipment to assembly areas or plants is by pallet.

With these methods, "impossible" production rates have been attained, with lowered costs and better-quality welds.

Pants or Prints

BEATTY MACHINE & MFG. CO., Hammond, Ind., compiles batches of miscellaneous-size blueprints on each shop order. This polyglot group of prints is stapled or tacked together and identified with red pencil on the back of the outer print. The group is then clipped with an ordinary pants hanger and suspended from a bar, first in the engineering department, then in the shop office for ready reference during the course of the job. Pants hangers can, of course, be used over and over again. The "blueprint closet" in each department is simply a length of galvanized iron pipe supported about 6 ft above the floor.

Daffynitions

CROONER: singer coming out of the ether . . . WOLF: guy who knows all the angles . . . LICENSES: what pet dogs have only one of, but stray dogs are covered with . . . BAD LIQUOR: something that may result in damage to the eyes, particularly if it isn't paid for . . . VINTAGE: mark of distinction for wines, of extinction for women . . . HONEYMOON: thrill of a wifetime . . . BUDGET: something that takes so much time to balance there's none left in which to spend money.

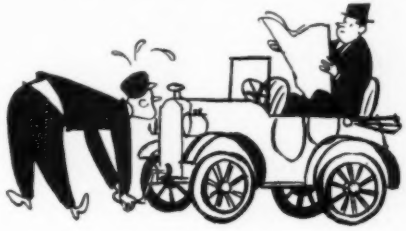
Controlled Chatter

A SUITABLE SOUVENIR for students in the machine-tool sales course, sponsored recently by the N.M.T.B.A. at Purdue University, seemed to be a miniature of the traditional "old oaken bucket." (An authentic bucket is contested for each year by the football teams of Purdue and Indiana Universities.) Prof. O. D. Lascoe, of the Machine Tool Laboratory, found he had some surplus 1½-in. aluminum bar, so he tooled up a Gisholt to produce the bucket bodies. The shape could be produced by a form cutter, but the resulting bucket didn't look particularly authentic because of the absence of staves. It was felt that the equivalent of stave separation marks could be produced by introducing chatter into form cutting. By setting the tool high and selecting the proper combination of speed and coolant, it was found possible to control chatter to get uniformly spaced markings. Polishing a series of annular rings over the chatter marks simulated the hoops on the bucket.

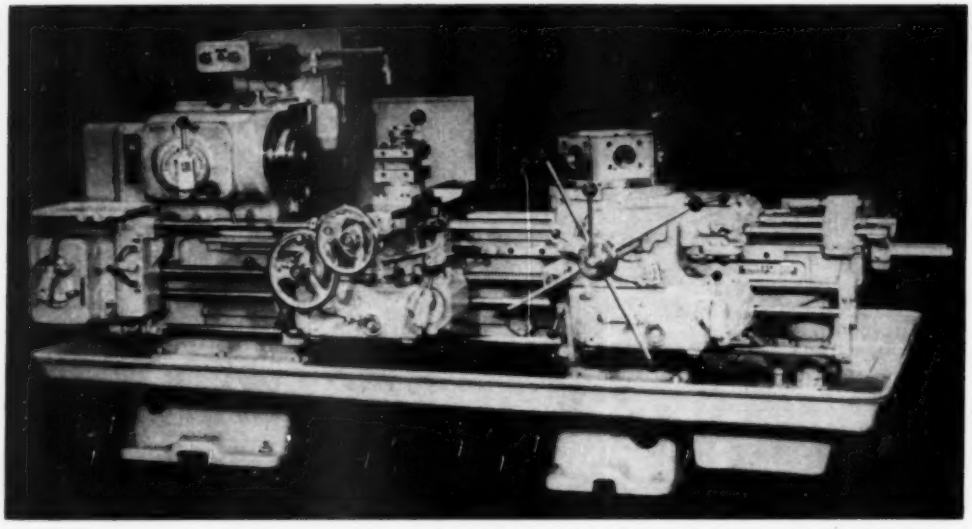
As we get the story, the only man to spot the deception at the award dinner was Tell Berna, general manager of the N.M.T.B.A. His questions led to detailed explanation of this peculiar and usually undesirable machining method.

No Chauffeur

IF MOST EUROPEAN CARS had been owner-driven, back in the early days, the U.S. might not have developed the self-starter. The story is that European car builders worked on starters, but abandoned them because buyers didn't want them—the chauffeur cranked the car. But in the U.S. the owner drove his own, so the self-starter was eagerly received when it came in in 1911.



New Shop Equipment



Lathe Equipped with Feed Safety Mechanisms

Safety interlocks are incorporated in both the saddle and carriage feed mechanisms of the Jones & Lamson Model 7A universal turret lathe. The units eliminate the possibility of followers being engaged with the leadscrew when feeds are engaged and vice versa. Both cross-slide and saddle are equipped with power rapid traverse, and the hexagonal turret is power indexed.

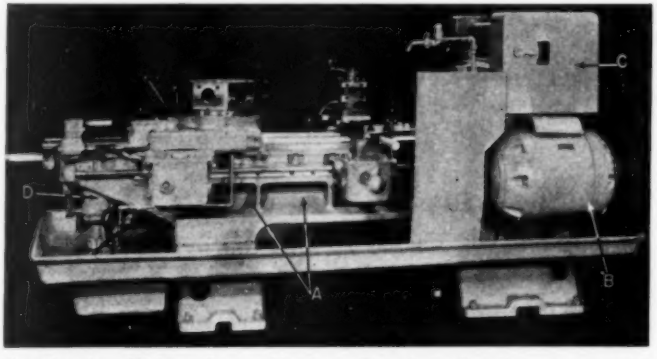
Model 7A has 2½-in. bar and 12-in. chuck capacity. A vertical adjustable motor mount will accommodate a 20-hp motor and the lathe is available in two ranges of 12 spindle speeds, 20 to 1000 rpm, or 30 to 1500 rpm. Pitch is determined by means of an all-sliding-gear quick-change gear box. All electrical controls, including a circuit interrupter, are mounted in a NEMA No. 12 enclosure at the rear of the lathe headstock.

A ¼-hp centrifugal pump delivers coolant to the standpipe and to each position of the hexagon turret as it is indexed. The bottoms of the legs are so designed that leveling plates can be inserted under them without lifting the machine from the floor.

A full-length leadscrew facilitates threading to a maximum turning length with the carriage or the saddle. Over-all functional design of the lathe is said to give special consideration to accelerated developments in high-speed metal removal.

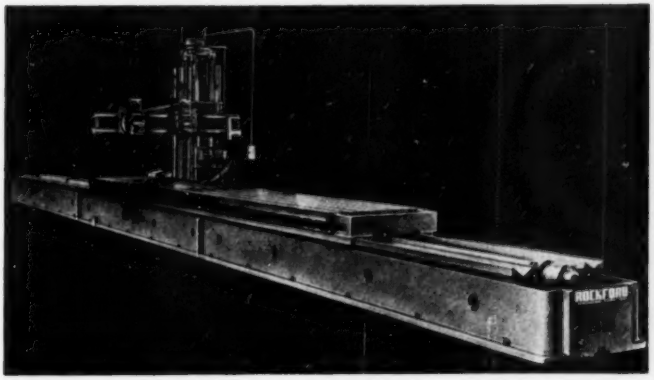
The unit is equipped with simple, adjustable, thread stops and a single-lever speed selector. Reverse feed for the saddle is also provided. The pitch-selector lever is located at the extreme left of the machine. This model weighs over 4½ tons without tooling.

Jones & Lamson Machine Co., Springfield, Vt.



Rear view shows (A) integrally cast chip chutes, (B) vertical, adjustable motor mount, (C) NEMA No. 12 electrical-control enclosure, and (D) 1/4-hp centrifugal coolant pump

Materials and Parts

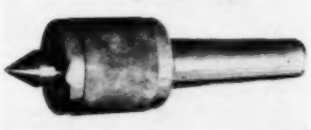


Rockford Planer Built With 33-Ft Cutting Stroke

A special hydraulic-cylinder assembly design is credited with making the 33-ft cutting stroke possible on this Rockford hydraulic openside planer. The planer is 73 ft long over-all and about 14 ft high. Cutting speeds are infinitely adjustable up to a maximum suitable for carbide cutting tools. To save time the speed of the return stroke is independent of the cutting-stroke speed.

Built with two cross-rail heads and one side head this planer has a maximum planing width for the right-hand head of 60 in. Maximum planing width including the use of the left-hand head is 72 in. and the maximum distance of table to rail is 72 in. The machine is built with simple, responsive, hydraulic-valve controls. Planers are built in both openside and doublehousing design.

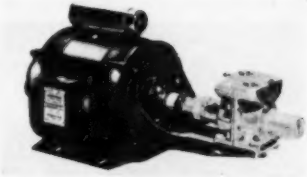
Rockford Machine Tool Co., Rockford, Ill.



Ball-Bearing Live Centers Permit Heavy Load Capacity

Ball-bearing construction of the Montgomery live center eliminates burning and regrinding and permits them to take a thrust load up to 60,000 lb. The point is made of hardened and ground tool steel. Live centers come in 12 different standard models, 25 different semi-standard models, or may be made specially to customer's specifications.

Montgomery & Co., 53 Park Pl., New York 7, N. Y.



Pump and Motor Units Supported on One Base

Supplied in ¼-, 1/3-, and ½-hp models, the close-coupled electric-motor-driven Eco gearless-pump units are entirely supported by the motor base. Pumps come with ¼-, ⅜-, ½-, and ¾-in. ports and are said to give excellent suction lift from circulation work up to 150-lb pressure.

Eco Engineering Co., 12 New York Ave., Newark 1, N. J.

...INCLUDING

Lathe chuck of revolutionary design employs Rubber-Flex collets which have a ¼-in. gripping range. Increased gripping power reported.....page 144

Die filer, available with variable stroke length. Worktable ults both front and back, permitting accurate filing for clearance on dies .....page 145

Jig mill for large area flat work with short holes furnishes 120-in. horizontal travel. Unit is equipped with power-operated tool lock .....page 146

Dc welding machine, said to incorporate many of the advantages of ac units, is equipped with selenium rectifiers.....page 154

Hydraulic hobbing press, rated at 1000 lb, is for accurate hobbing of intricate single- and multi-cavity molds.....page 158

Forging furnace has working hearth 11 ft. in dia. This unit can produce up to 900 lb of forgings per hr.....page 159

Semi-automatic die checker handles die blocks up to 800 lb and provides permanent inspection records.....page 160

NEW BULLETINS for your Shop Library includes 30-page booklet which provides a pictorial tour of a large contract manufacturing plant.....after page 189

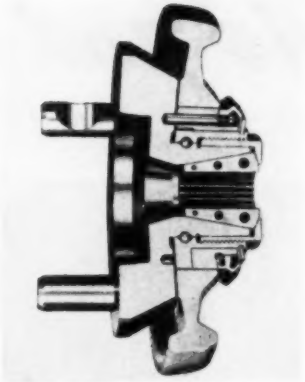
...and in December 1

Corner draw press, a hydraulic unit which forms one corner at a time, can handle most any radii and any panel size from 15x18-in. on up.

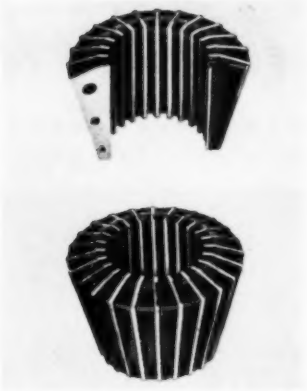
Cylindrical-broach resharpening machine incorporates advantage of mounting the broach between centers on a stationary bed and traversing the grinding wheel from tooth to tooth.

Universal diecasting machine is high-pressure hydraulic unit equipped with 10-hp two-stage pump which delivers 43 gal. per min.

Jacobs spindle-nose lathe collet chucks are adaptable to Camlock, taper-key-drive, American Standard, and threaded spindles.



Rotating handwheel tightens threaded sleeve on collet, locking work. No draw-in bar or lever is needed to either lock or free work.



Rubber-Flex collets are composed of synthetic rubber, bonded and mechanically locked to steel jaws. Gripping range is 1/8 in.

Jacobs Lathe Chuck Employs Flexible Collets

Providing gripping power reported to be from 2 to 4 times that of chucks with split steel collets, the Jacobs spindle-nose lathe collet chuck employs Rubber-Flex variable-size collets. Composed of special Hycar synthetic rubber, bonded and mechanically locked to hardened and ground tool-steel jaws, these collets have a $\frac{1}{8}$-in. gripping range. Only eleven collet sizes are needed to chuck any bar from 1/16- to $1\frac{3}{8}$-in. dia, as compared with 88 standard collets.

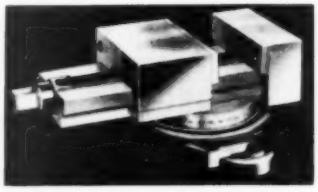
Work is locked in place by means of an impact mechanism, actuated by quickly rotating the handwheel. No draw-in bar, lever, or other device is needed to lock work in the chuck or to free it. The chuck handwheel is solid aluminum and all working parts are of alloy steel, hardened and ground. Models are now available for Camlock, taper-key-drive, American Standard, and threaded spindles.

Jacobs Mfg. Co., West Hartford 10, Conn.

High-Speed Press Brake Does 80 Strokes per Min.

Incorporating both automatic press-control safety mechanism and automatic overload protection, this high-speed press brake has a 35-ton capacity and a 15x42-in. die area. The wide bed and ram areas are for mounting of punching and blanking dies. The units attain speeds up to 80 strokes per min. Heavier tonnages and larger dies are available.

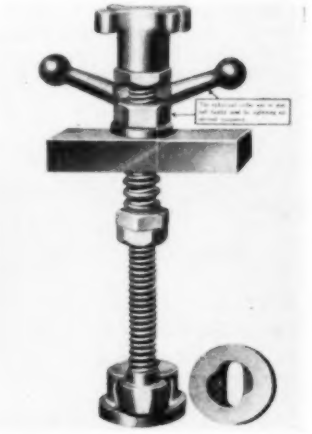
The Cyril Bath Co., 6919 Machinery Ave., Cleveland 3, Ohio.



Small Machine Vise Mounts on Machine Tool Beds

South Bend swivel vise which holds work on machine tools has a maximum jaw opening of 4 in. and swivels 90° to right or left. Vise jaws have replaceable hardened steel inserts 4 in. wide and 1 in. deep.

South Bend Lathe Works, 378 E. Madison St., South Bend 22, Ind.

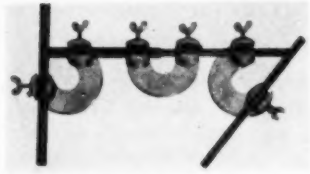


Fixture Clamps Casting Through Hole to Pilot Plate

Morton fixture clamps, developed for clamping a casting through the bored hole of a pilot plate, employ an aligned T-bolt engaging a hardened

insert. The T-bolt can be cut off to suit any height of job. Locknuts and spring are also adjusted for height preventing the clamp strap from dropping to the bottom of the T-bolt.

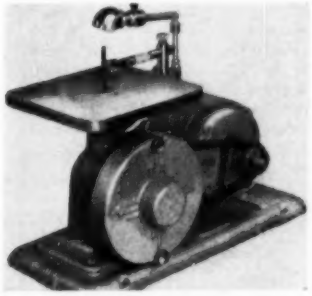
Morton Machine Works, 2421 Wolcott St, Detroit 20, Mich.



Welding Clamps Hold Plates, Bars, Being Joined

Developed primarily to hold plates, bars, and tubing while they are being united by welding, brazing, or soldering, PRO-CLAMPS accommodate thickness of diameter from 0 to 1 in. Over-all dimensions are 5½x8 in., and weight is 3 lb. The clamps are rotatable and can be preset at any angle from 0 to 180°. The frame of the tool is inscribed with two accurate PRO-TRACTOR scales so that angle setting will be exact.

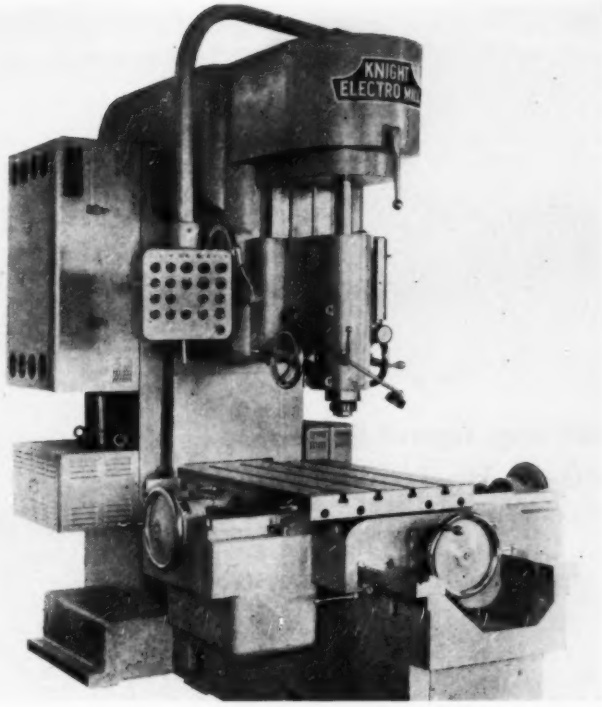
Bernard Welding Equipment Co., 741-43 East 71st St., Chicago 19, Ill.



Benchmaster Die Filer Affords Variable Stroke Length

Available with either ⅛- or ¼-in. shank file, this die filer has a stroke length which is variable from 3/16 to ¾ in. Reciprocating mechanism is spring loaded, automatically compensating for wear and eliminating need for adjustment throughout life. The 8½-in. square table tilts front and back, permitting accurate filing for clearance on dies. A special neoprene bellows keeps filings out of the bearing surrounding the reciprocating shaft.

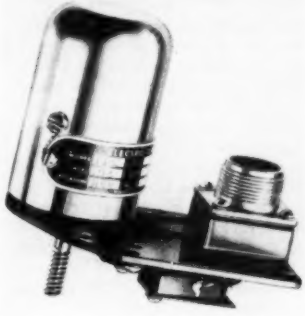
Benchmaster Mfg. Co., 2952 West Pico Blvd., Los Angeles, Calif.



Heavy-Duty Miller Provides High Versatility

The Electromill heavy-duty vertical milling, drilling, and boring machine may be equipped with variable-speed motors for wide versatility, or with constant-speed motors for specialized production work. It can be changed to suit changing work conditions on milling, drilling, boring, routing, jigs, fixtures, experimental, or production work. A heavy V-belt drive and built-in flywheel with variable speed range provides smooth drive. Speed and feed changes are electronically controlled and are made with a small knob. They can be increased while the machine is in operation to produce maximum work. A button stops the cutter instantly. Safety clutches prevent jamming feed or overloading drive.

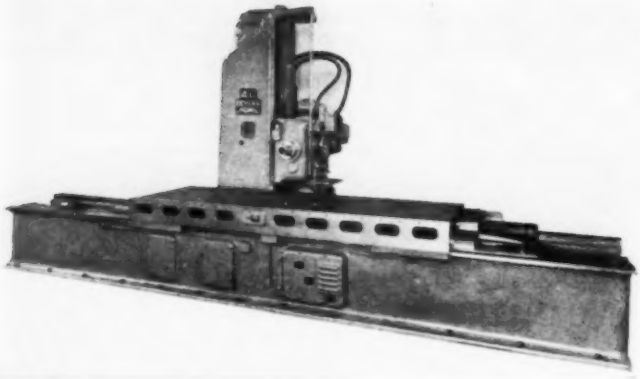
W. B. Knight Machinery Co., 3920 West Pine Blvd., St. Louis 8, Mo.



Small DC Motor Transmits Linear or Rotary Motion

Running torque of this 1/100-hp dc motor is listed at 1 in. oz at 10,000 rpm, 28-volt dc but motor is said to be adaptable to many other torque and speed requirements. It can be used for any kind of application requiring linear or rotary motion. Weight of the motor is 15 oz. Dimensions are 2.875 in. x 1.75-in. dia and mounting plate measures 2.7 x 3.4 in.

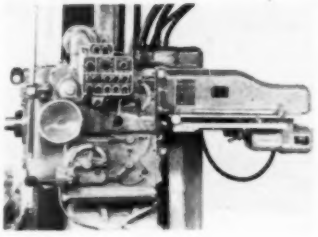
Electro-Aire, Inc., 11439 Vanowen St., North Hollywood, Calif.



DeVlieg Jigmil Provides 120-in. Horizontal Travel

Designed for large-area flat work with short holes, the Model 4-C Jigmil is available with 96- or 120-in. horizontal travel. Bed lengths are double the horizontal travel to insure full table support throughout bed range. Vertical spindle travel is from 3 to 53 in. above the top of the table. Table width is 37½ in. Milling feeds including rapid traverse range from 0.3 to 160 in. per min. The unit is equipped with a power-operated tool-lock mechanism. Spindle speeds range from 900 to 1800 rpm and drive is 5- to 10-hp.

DeVlieg Machine Co., 450 Fair Ave., Ferndale, Detroit 20, Mich.



Jigmil control panel includes power tool-lock control. To lock tool operator merely puts it in spindle and pushes tool-lock button. Rotation of motorized drawbar does the rest.

Multi-Purpose Stand Mounts Coating, Polishing Pans

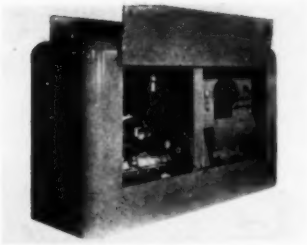
Built for heavy-duty operation the No. 1-C multi-purpose stand carries pans either steam-heated or standard, up to 42 in dia. A heavy-duty upper bearing carries most of the load and takes both axial and radial thrust. The angle of support is adjustable for operator convenience or work requirements.

F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20, Pa.

Multi-Max Punch Press Features 16x48-in. Bolster Area

Rated at 30-ton capacity the Diamond Model 3048 punch press combines a 16x48 in. bolster area as a 10x48½ in. ram area that performs a wide variety of metal stamping operations including blanking, piercing, notching, bending, shearing, and drawing. Standard stroke is 2 in. and maximum stroke to order is 4 in. It has a speed of 80 strokes per min. The recommended drive is 3 hp 1800 rpm motor. Net weight is approximately 4150 lb.

Diamond Machine Tool Co., Los Angeles, Calif.



Heavy-Duty Arc Welder Built in 300-, 400-Amp Sizes

The Wilson 36A "Yellow Jacket" arc welder is said to be best suited for pipeline work or construction jobs where ruggedness and durability are important factors. It is a direct current, 40-volt, NEMA-approved variable-voltage generator. The unit is 76x11, 28x11x49 in. high.

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Flexible Hydraulic Hose Constructed of Rayon Cord

Highly flexible RR 2-ply rayon cord hydraulic hose assemblies can be fitted with any combination of pressed-on male or female solid or union couplings, available in sizes ¼- to 1-in. ID. Constructed of synthetic core, two-ply braided rayon cords and neoprene cover the hose has burst pressures ranging from 2400 to 6000 psi depending upon the diameter.

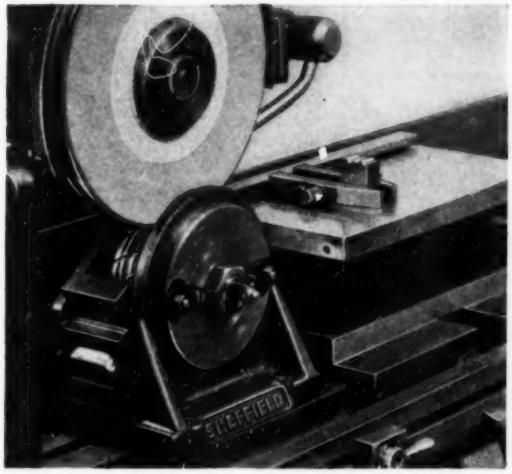
J. N. Fauver Co., Inc., 49 West Hancock, Detroit 1, Mich.

15-oz Pneumatic Grinder Operates at 75,000 rpm

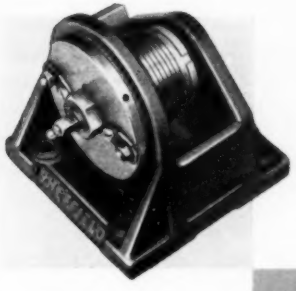
Wheels of ½-in. dia and smaller can be accommodated on the Keller 30-A-7 15-oz pneumatic grinder. With a speed of 75,000 rpm the unit is ideal for touching up dies. An inverted throttle lever provides operating control. Standard spindle collet accommodates mounted grinding wheels with ⅛-in. dia shanks. Optional equipment includes spindles with 3/16- or ¼-in. capacity collet chucks.

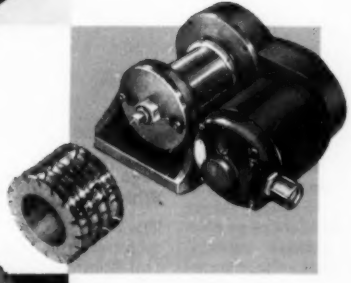
Keller Tool Co., Grand Haven, Mich.

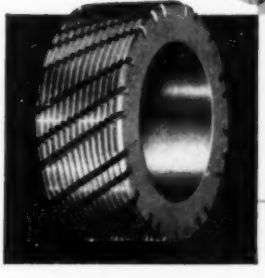
Cut Grinding Time up to 75%



and
Reduce the Cost
of Dressing Tools at the Same Time







If you are producing threaded or formed parts, flat or cylindrical, you can make significant savings in both time and over-all costs by the use of Sheffield Crushtrue Devices on commercial surface and cylindrical grinders.

A Crushtrue Roll forms the face of the grinding wheel accurately regardless of how intricate the form may be. Work parts are then ground with this wheel in much less time than is possible by any other method of wheel forming.

Sheffield maintains a stock of Crushtrue Rolls for immediate delivery on all standard U. S. threads from 8 to 32 pitch. When your Std. U. S. Thread Rolls need regrinding, ship them to Sheffield and reground rolls from Sheffield's "Bank" will be shipped to you within 24 hours. You don't have to wait for your original rolls to be reground.

As long as you continue returning your Sheffield standard thread Crushtrue Rolls for regrinding, you will get immediate replacements on an economical cost basis. You will never have to buy new rolls.

The Sheffield "Bank" plan reduces your costs and down time if you manufacture threaded production parts, thread rolling dies or 60° serrated tools. Sheffield Crushtrue Rolls are the answer to greater economy and more productivity.

Crushtrue Rolls for special threads and forms can be supplied economically and promptly.

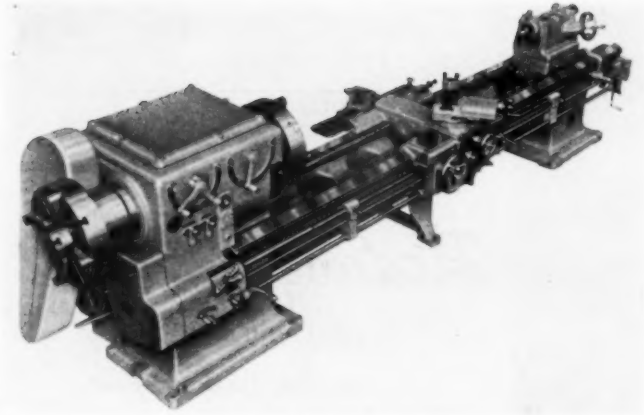
Write for information or for a personal conference.

5439

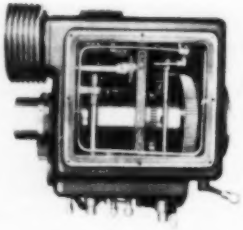
the *Sheffield* corporation

Dayton 1, Ohio, U. S. A.

MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS



20-In. Hollow Spindle Lathe Provides 27-In. Swing Over Bed



Headstock of lathe offers 18 selective spindle speeds ranging from 10 to 362 rpm. Nine-in.-dia hollow spindle is supported at both ends on precision bearings

Available with center distances starting at 48 inches and increasing in 24-in. increments, the LeBlond 20-in. hollow-spindle lathe has an 18-speed geared head stock and is arranged for 20-hp main-drive motor. The lathe will swing 27 in. over bed and carriage wings. Spindle speeds range from 10 to 362 rpm. An electric break with apron spindle control gives fast response in starting, stopping, and reversing the spindle.

Quick-change feed box is totally inclosed, automatically lubricated, and offers 63 feed and thread changes. The lathe has hardened and ground steel bed ways, front and rear, one-piece apron with positive jaw feed clutch, and thrust-lock tailstock. Floor space required is 130x67 in.

The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio

Drain Automatically Removes Water from Compressor Tank

Said to completely eliminate manual draining on all types of air compressors having bleed or pressure-type unloaders, the Quincy Dri-R-Air tank drain can be installed with a few feet of ¼ in. O.D. copper tubing plus a standard L. The drain is made of noncorrosive rust-proof brass and has only one moving part.

Quincy Compressor Co., Quincy, Ill.

Smoke Detector Polices Several Plant Areas at Once

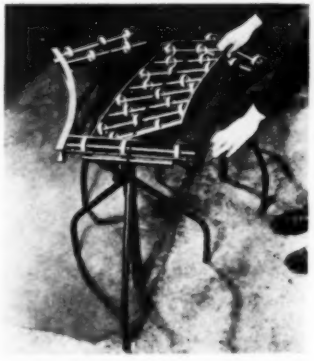
A control cabinet and an analyzer tube are the two main units comprising the Kidde multi-space smoke detector. The cabinet contains an electric panel with automatic supervisional circuits, constant voltage transformer, exhauster fan, and motor-driven selector valving system. Each protected area or zone has one or more accumulators which continually draw in air samples which are drawn to the analyzer tube. When 3 percent or more smoke is present in the air sample an alarm rings and the indicator tells the exact location from which the smoky sample came.

Walter Kidde & Co., 40 East 34th St., New York 16, N. Y.

Die Casting Machine Produces 600 Shots Per Hour

Small, self-contained machine is for high-speed production of die castings of lead, tin, or zinc base alloys. Model 20 has maximum shot capacity of one pound (zinc) and will produce up to 600 shots per hour. Maximum casting area at 1300 psi is 9 sq in. with adequate casting area provided by die plates measuring 10x10 in.

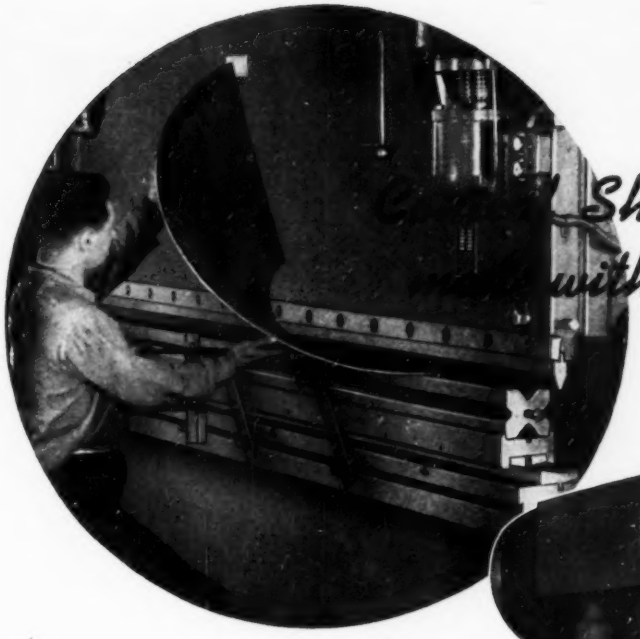
Dept. D-4, Reed Prentice Corp., Worcester 4, Mass.



Sage "Y" Switch Available With Wheels or Rollers

The Sage "Y" switch directs flow of material from one single line into two lines, parallel or converging at 45° angles, either to right or left. To change direction the operator flips the center section and locks it in position. The switch is available with wheels or rollers. The wheel type employs ¼-in. high carbon-steel axles with 4 to 6 wheels per axle. Both types are available for 12-, 14-, 18- and 24-in. conveyors. Special sizes are made to order.

Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.



Shapes quickly with bending dies

Conical shapes are easily made on Steelweld Presses with the same dies as are used for straight bending work. The ram-tapering mechanism, one of many exclusive Steelweld features, makes this possible.

For bending, forming and punching metal — single jobs or large production runs — Steelwelds are versatile money-making tools, easily operated by inexperienced workers. Often the same dies will perform many kinds of work. When necessary to change dies, it is usually a simple matter, quickly done.

The illustration above shows conical-shaped bottoms being formed of 3/16-inch plate for buckets 48 inches in diameter.

Steelwelds will work plate of all thicknesses to one inch and lengths to 20 feet.

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CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

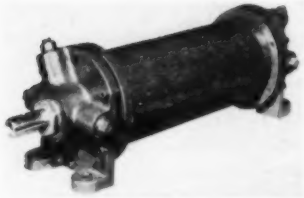
THE CLEVELAND CRANE & ENGINEERING CO.

1424 EAST 281st STREET, WICKLIFFE, OHIO

STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING



Tomkins-Johnson Air Cylinders Built Without Tierods

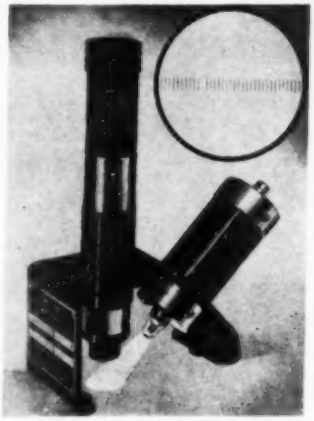
Round snap rings seated in grooves in the cylinder body and steel clamping collars have replaced tierods in this line of T-J air cylinders. Operating between 80 and 100 psi these cylinders are offered in several different styles up to 8-in. bore. They are available with or without adjustable cushions.

Tomkins-Johnson Co., Jackson, Mich.

Tube Fitting Provides Triple Seat, Axial Support

"Swagelok" clinch-type fittings provide leak proof seals at three points. Two ferrules and a threaded chuck clamp around a tube have virtually no effect on the inner wall and leave flow of liquids or gases completely unimpeded. Tests indicate that tubing will burst before these fittings will leak. This fitting is slipped onto the end of the tube and given 1¼ turns with a standard wrench. The Swagelok is for use with any type of metal or plastic tubing.

Crawford Fitting Co., Cleveland 17, Ohio



Industrial Microscope Provides Self-Light Source

Clarkstan Model 232 industrial microscope is equipped with a self-light source and built-in measuring scale. Available with magnification of either 20x or 40x, this unit is focused by means of a friction sliding tube. With battery, light, and extension for 40x, the unit is priced at $22.50 net to the user.

Clarkstan Corp., 11927 West Pico Blvd., Los Angeles 34, Calif.

Diamond-Wheel Truing Device Driven by a Trued Wheel

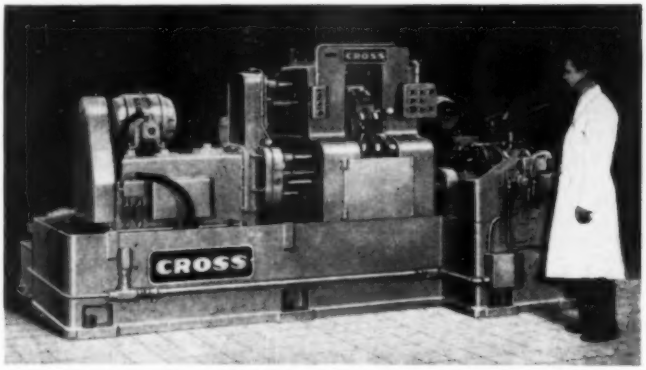
Brake-controlled truing device will accommodate diamond wheels of all bond types with the exception of resinoid-bonded diamond wheels finer than 220 grit. It is said to have trued an 18-in. metal-bonded diamond cut-off wheel found to be 0.015 in. out of round in 1½ min. It is a self-contained unit that is driven by the diamond wheel to be trued.

Norton Co., New Bond St., Worcester, Mass.

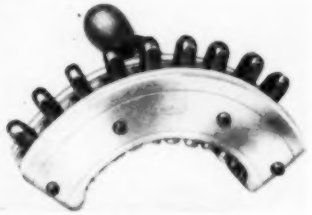
Electronic Air Cleaners Are Self-Renovating

Westinghouse Precipitron cubicles are designed for use in multiples, the number of units depending upon the volume of air to be cleaned. When the plates the collector cell become loaded with dirt, a control automatically takes the unit out of service, closes the louvers, washes the cell bank, applies fresh adhesive, and puts the unit back into service.

Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa.



SPECIAL MACHINE TOOL for finishing refrigerator crankshafts completes five drilling and two milling operations on 145 crankshafts per hour with only one unskilled operator. The Cross machine is an automatic-index trunnion unit. Two deep oil holes are drilled progressively — one in three stations and the other in six stations. The two milling operations are performed independently of the drilling by an automatic unit— *The Cross Co., Detroit, Mich.*



Chatterless Countersink Set In Special Wooden Box

Made of high-speed steel, ground after hardening, these three sets come in strong wooden boxes which hold each size separately for proper storage. Sizes range from ¼- to 2-in. dia. with 30, 41, 45° angles.

Grobet File Co. of America Inc., 121 Canal St., New York 13, N.Y.

EACH month *The Saturday Evening Post* readers by the thousands see a Nicholson cartoon ad like this which helps to make "Nicholson" the most widely remembered name in files. But industrial production heads and workers know these famous files for their *practical* qualities . . . for having all the essential requisites of "the perfect file," to wit:

- **STRAIGHTNESS**—for holding the filing stroke "to the line" when necessary.
- **ACCURATE CUT**—teeth of even height, sharpness and spacing to assure full, smooth bite.
- **UNIFORM HARDNESS**—to avoid "skips-and-grabs" and uneven wear.
- **PROPER BALANCE**—for steady filing strokes.
- **GOOD STEEL**—for long file life.

No wonder the world's largest file manufacturer can guarantee you *Twelve perfect files in every dozen!* No wonder leading industrial distributors prefer to recommend and sell you the Nicholson brand—or its twin, Black Diamond! Write to us for:

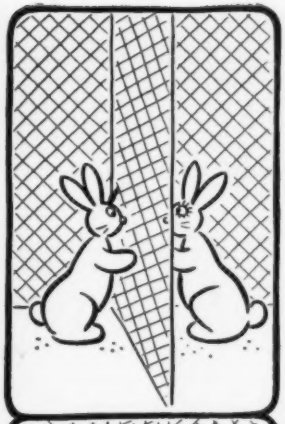
FREE TECHNICAL BULLETIN on ten Special Purpose files to help assure you *The right file for the job.* **FREE BOOK, "*FILE FILOSOPHY*"**—the Nicholson "textbook" on kinds, use and care of files (sixteenth popular edition).

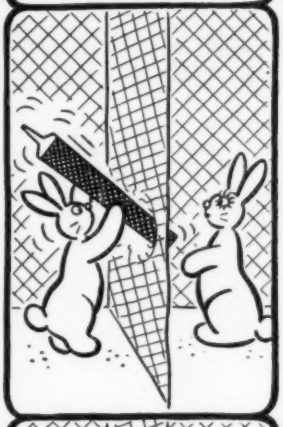
NICHOLSON FILE CO., 29 Acorn Street, Providence 1, R. I.
(In Canada, Port Hope, Ont.)

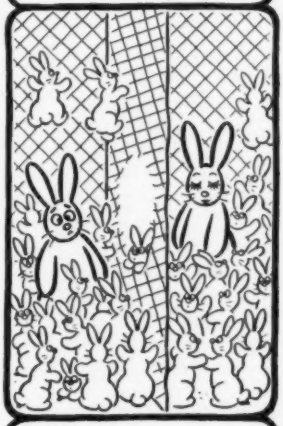
NICHOLSON FILES *FOR EVERY PURPOSE*

LONG ANGLE LATHE FILE to produce a fine finish on metal being turned in a lathe.

Things you need in the files you use







a Nicholson file for every purpose

Accurately cut, perfectly balanced, uniformly hardened. Made by the world's foremost file manufacturer.

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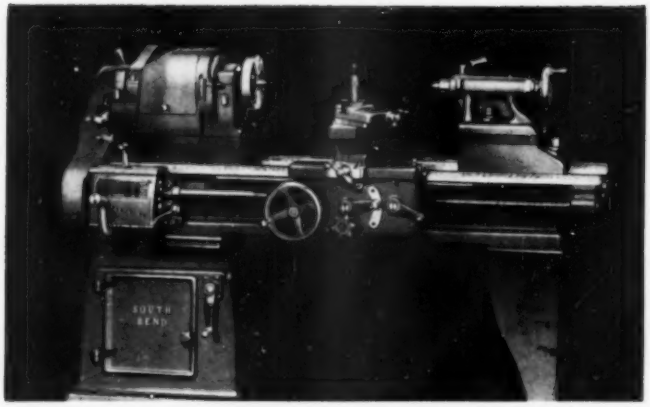
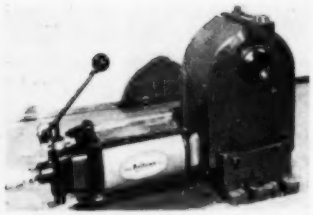


Large-Swing Lathe Has 16 Spindle Speeds

Built primarily for machining large-diameter work that is not excessively heavy, the new South Bend 16/24-in. lathe has sixteen spindle speeds ranging from 11 to 727 rpm. Maximum swing over the carriage is 24¼ in., over saddle cross slide with chip guard is 18¾ in., and over cross-slide without chip guard is 19¼ in. Distance between centers varies from 30 to 102 in. depending upon length of bed. Power longitudinal feeds range from 0.0015 to 0.0841 in. and cross feeds from 0.0006 in. to 0.0312 in. Full quick-change gear mechanism provides 48 pitches of screw threads ranging from 4 to 224 per in., right or left hand. Drive is by two-speed 1½-hp motor, mounted in cabinet under headstock.

South Bend Lathe Works, 378 E. Madison St., South Bend 22, Ind.



Collet Chuck Powered by Bellows Air Motor

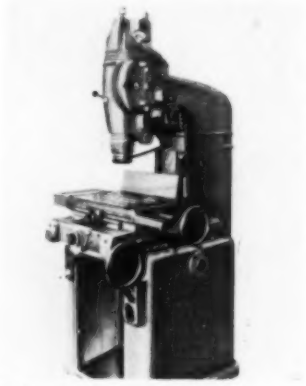
Holding power of the Bellows BZC-10 "Controlled-Air-Power" collet chuck is said to be sufficient to withstand severe drilling, tapping, and milling without fear of the workpiece slipping or twisting. At 60-lb airline pressure, the gripping power equals approximately 185-ft lb torque. This collet chuck will handle most standard collets with stock clearance up to 1⅜ in. The Bellows collet chuck is available either with a manually operated valve or with the Bellows electrically controlled air-powered valve.

The Bellows Co., Akron, Ohio.

Lathe Toolbits Provide Built-In Clearances

The Du-Bit lathe toolbit is manufactured with both lead clearance and point clearance formed in the blank. They are supplied in several standard high-speed steel grades ground or unground, and in a variety of standard cross-sectional sizes and lengths.

The Dow Mechanical Corp., Thompsonville, Conn.



Swiss Precision Jig Grinder Operates up to 75,000 RPM

With 16-in. longitudinal travel and 10-in. traverse travel, the Hauser Model 3S has a grinding-diameter capacity of 5 in. Spindle speeds up to 75,000 rpm are obtained. Small and medium-size holes are ground with the normal high-speed grinding spindle and larger holes, using special set-off grinding head with eccentric adjustment.

Spindle unit, incorporating automatically lubricated precision ball and roller bearings, is driven by compressed air. Provision is made for grinding taper holes with an included angle up to 3° on a length of 2-5/16 in. Working surface is 22 x 12¾ in. The dial indicator for depth measurements, reading to 0.001, facilitates the grinding of blind holes accurately to depth.

Hauser Machine Tool Corp., Manhasset, N. Y.

Blast-Cleaning Shot Made of Heat-Treated Steel

Tru-Steel shot made from genuine heat-treated steel is for use in all types of blast-cleaning equipment. This shot is said to have greater hardness and toughness and a much longer useful life than chilled iron shot. It is available in all sizes.

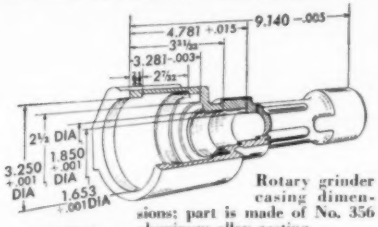
American Wheelabrator & Equipment Corp., 719 Byrkit St., Mishawaka, Ind.

Tygon Protective Coat Is Self-Priming Vinyl Paint

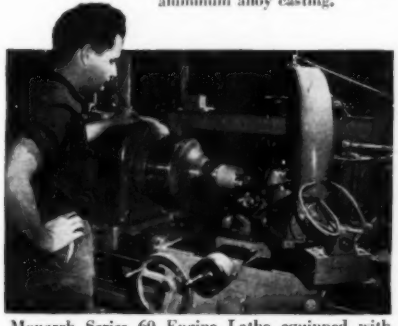
Developed as an easily applied protective coating to resist corrosive conditions not sufficiently severe to warrant application of multiple coat series of Tygon Paints, the Series "K" Tygon paint coating is a self-priming vinyl base that adheres to metal, wood, or concrete. For normal conditions, two to three coats of Tygon Series "K" provides effective and long-lasting protection from corrosion. It may be applied by brush or sprayed.

The U. S. Stoneware Co., Akron, Ohio.

Battery of 3 Monarch Series 60 Engine Lathes, "Air-Gage Tracer"-equipped, producing rotary grinder casings in the Cleco Division plant of the Reed Roller Bit Company, Houston, Texas.



Rotary grinder casing dimensions; part is made of No. 356 aluminum alloy casting.



Monarch Series 60 Engine Lathe equipped with "Air-Gage Tracer", turning rotary grinder cases at Reed Roller Bit Company. Operations include rough and finish inside diameters, faces, chamfers, undercuts and reliefs. Cemented carbide tools used.

Picture of
PRODUCTION
3.75 times faster

Air-Gage Tracing has cut 16.42 minutes off the time for machining these rotary grinder cases. On a turret lathe they took 22.42 minutes each; now they're roughed and finished in a total of 3.70 minutes—and handling and gauging time adds another 2.30 minutes—6.00 minutes in all, complete!

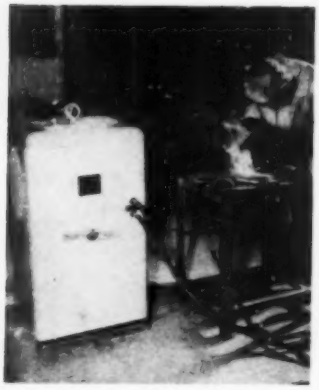
There's a saving on tools and tool sharpening, too. On the turret lathe, hand reaming was necessary, using four reamers. The "Air-Gage Tracer"-equipped Monarch Series 60 Lathe does the job with such accuracy and fine finish that no reaming is needed.

For similar savings in your own contour turning, boring and facing—or step shaft production, investigate the stepless, single tool Monarch "Air-Gage Tracer" attachment. It is applicable as factory equipment on all lathes in the Monarch line.
Ask for Bulletin 2604.

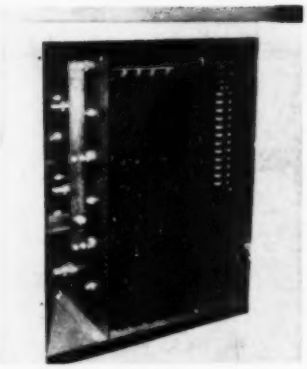
ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER*—TURN TO MONARCH



Welding unit can be equipped with skids, 5-in. swivel-mounted wheels, or heavy duty running gear.

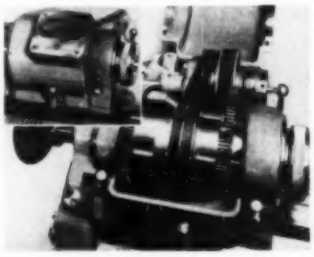


Side door allows ready inspection of filter, blowout of rectifier plates or conversion from 220- to 440-volt service.

DC Welding Machine Equipped With Selenium Rectifiers

Through the development of a small, light, efficient rectifier, Westinghouse has produced a dc welding machine said to include the advantages of ac units. The welder consists of a three-phase transformer, a three-phase adjustable reactor, and a three-phase full-wave rectifier. Current adjustments from 30 amps at 20 volts to 400 amps at 40 volts can be made on the 300-amp welder. It is about two feet square, 3½ ft. high and weighs 510 lb. A small ventilating fan, run by a 1/12-hp motor, contains the only rotating parts in the unit. The no-load loss of this welder is only 500 watts. And no-load kva input is 0.67. Units can be equipped with skids, 5-in. swivel-mounted wheels, or heavy duty running gear.

Westinghouse Electric Corp., P.O.Box 868, Pittsburgh 30, Pa.

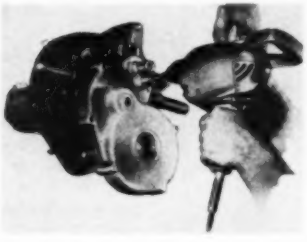


Precision Lathe Speeds Range from 32 to 2000 rpm

A dual drive system in the Wade Model 8A precision lathe gives the unit a spindle speed range from 32 to 2000 rpm. With back gears engaged the stepless spindle speeds are from 32 to 220 rpm. High speeds are handled by matched V-belts on the open drive.

Powered by 1-hp motor the lathe obtains ample torque for low spindle speeds because of the back-gear ratio of 9 to 1. The variable speed drive has an electric tachometer located on the face of the headstock housing which registers all spindle speeds.

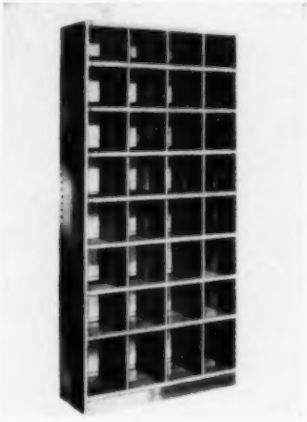
The Wade Tool Co., Waltham, Mass.



Portable Pipe Threader Is Gear-Reduction Unit

Capable of threading up to 8-in. pipe in any position, the Porta-Drive portable pipe threader is a 20 to 1 gear-reduction unit driven by any ½-hp heavy-duty electric drill. It is attached to any standard set of dies by specially designed adapter yokes. A reverse-drive socket allows quick removal of the dies after threading is completed. Designed to fit the average toolbox, Porta-Drive weighs only 14 lb.

Muncie Gear Works, Inc., Muncie, Ind.



Storage Bin Units Have Adjustable Shelves, Dividers

Dividers in the 78-in. Lyon bin units are adjustable horizontally every inch and shelves are adjustable up and down every 1½ in. when dividers are not used. Shelves are reversible to provide flat or bin-type storage. Bin units are 3 ft wide, 1 ft deep and 6½ ft high.

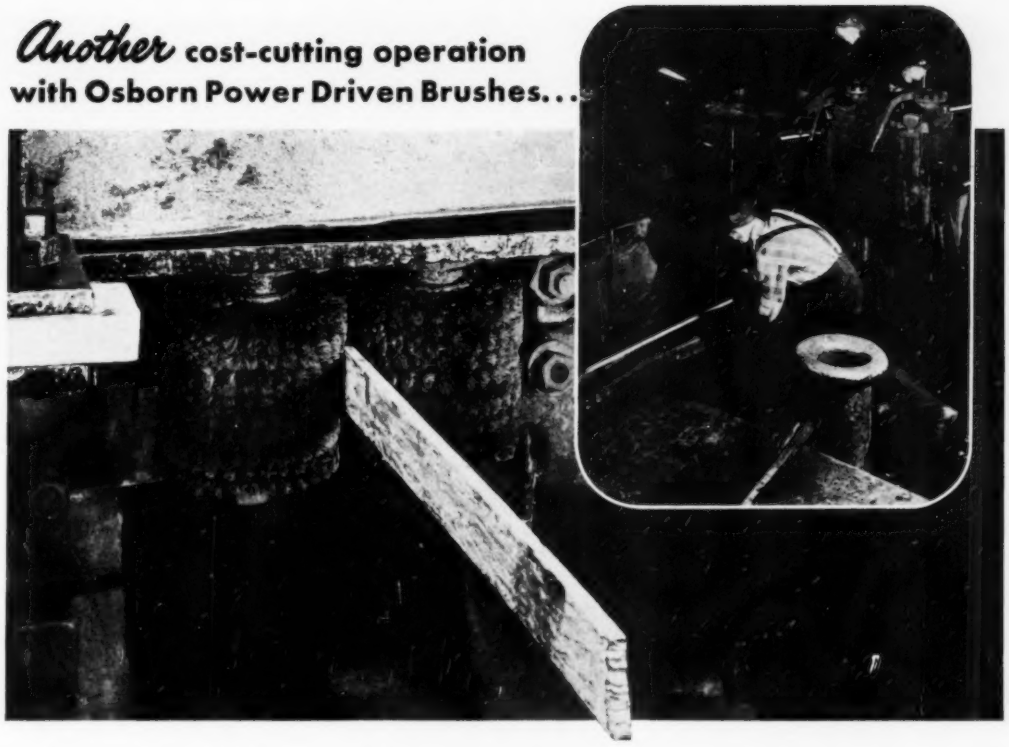
Lyon Metal Products, Inc., Aurora, Ill.

Toolholder Locking Pit Eliminates Bit Vibration

A lock block, screw, and lock nut arrangement on the Ready Rigid tool holder clamps the carbide bit against the work surface with rigidity and is said to eliminate "shaking loose" under extreme vibrating conditions. The same rigidity is reported to provide up to two and three times greater production for regrinding. Only one brazing is needed to an entire bit. The holder is available for round, square, rectangular, and triangular bits of all standard sizes.

American Die & Tool Co., Reading, Pa.

Another cost-cutting operation with Osborn Power Driven Brushes...



Here's How to clean mill scale from red-hot steel bars at *12 miles* per hour*

CLEANING red-hot steel bars of scale at speeds up to 1,000 feet per minute, or approximately 12 miles per hour*, is a real production job—requiring real production tools!

And progressive steel mills, intent on improving the quality and appearance of bar stock, are removing secondary heat scale with Osborn Power Driven Disc-Center** Wire Wheel Brushes.

Here's how it's done...fast, economically, thoroughly. Flat pieces of hot steel come through the mill and are run through a machine of special design against the direction of tough, Osborn Disc-Center Wire Wheel Brushes. The steel has a temperature approximating 1900° F. while it threads through the twin set of rotating brushes.

Simple? Of course. Just a matter of combining ingenuity with the right type of Osborn Power Driven Brushes.

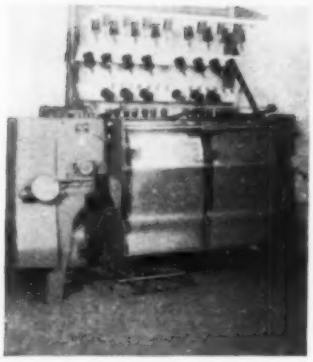
Osborn's 57 years' experience in building better brushes for industry is exemplified in hundreds of production operations...cleaning, roughing, deburring, finishing, polishing. There's a wealth of practical cost reduction ideas that are yours for the asking. An Osborn Sales Engineer will gladly show you why power brushes are today's most modern production tools, without obligation. Write or call—

THE OSBORN MANUFACTURING COMPANY
Dept. 203, 5401 Hamilton Avenue *Cleveland 14, Ohio*

Osborn Brushes ®

**Trade-mark

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES



Globe Machine Winds Ignition Coils, Transformers

This Globe winding machine winds coils requiring insulation paper between layers. Ignition coils, transformers, ballasts, and other coils having a definite space and insulation requirement are wound automatically at high speeds on this machine. The arbor winds at a selected speed up to 2500 rpm during the layer, promptly slowing to approximately half speed for paper insertion, and resuming preset winding speed after insertion. The average ignition coil can be wound in less than one minute.

Globe Tool & Engineering Co., 436 Davis Ave., Dayton 3, Ohio.

Bolts Available to Meet J. I. C. Standards

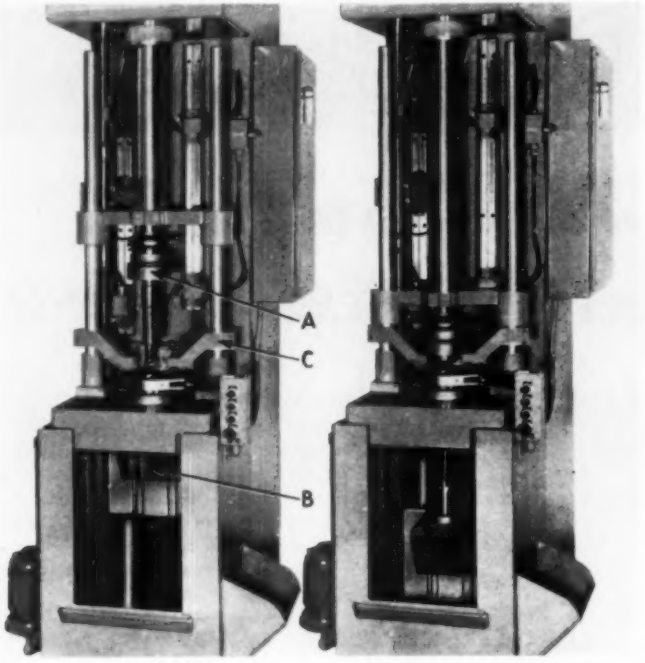
Mounting bolster and T-slot bolts made in accordance with standards recently adopted by the Joint Industrial Conference of American Manufacturers are being manufactured by West Point Mfg. Co. T-slot bolts of $\frac{1}{2}$-, $\frac{5}{8}$-, and $\frac{3}{4}$-in. dia and lengths up to 12 in. are available, as well as 1-in. bolts from 4 to 22 in. in length. Square heads to 3 in. and hexagonal to $2\frac{5}{8}$ in. are being made.

West Point Mfg. Co., 19625 Merriman Court, Farmington, Mich.

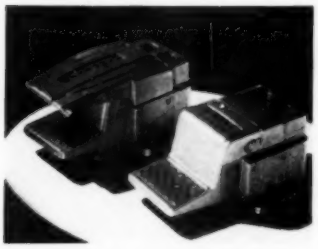
Induction Heating Unit Rated at 25 KW

Available for operation on 230-, 460- and 550-volt, 3-phase, 60-cycle power, the LI-25 induction-heating unit is a high-frequency vacuum-tube converter suitable for heating metal and other electrical conducting materials. With rated output of 25 kw at 100% duty cycle, this unit is equipped with an interlocked solenoid valve which controls work-coil cooling-water protecting coils from burnout. The LI-25 is available with one or two working stations, each complete with both high- and low-impedance terminals.

Lindberg Engineering Co., High Frequency Heating Div., 2444 West Hubbard St., Chicago 12, Ill.



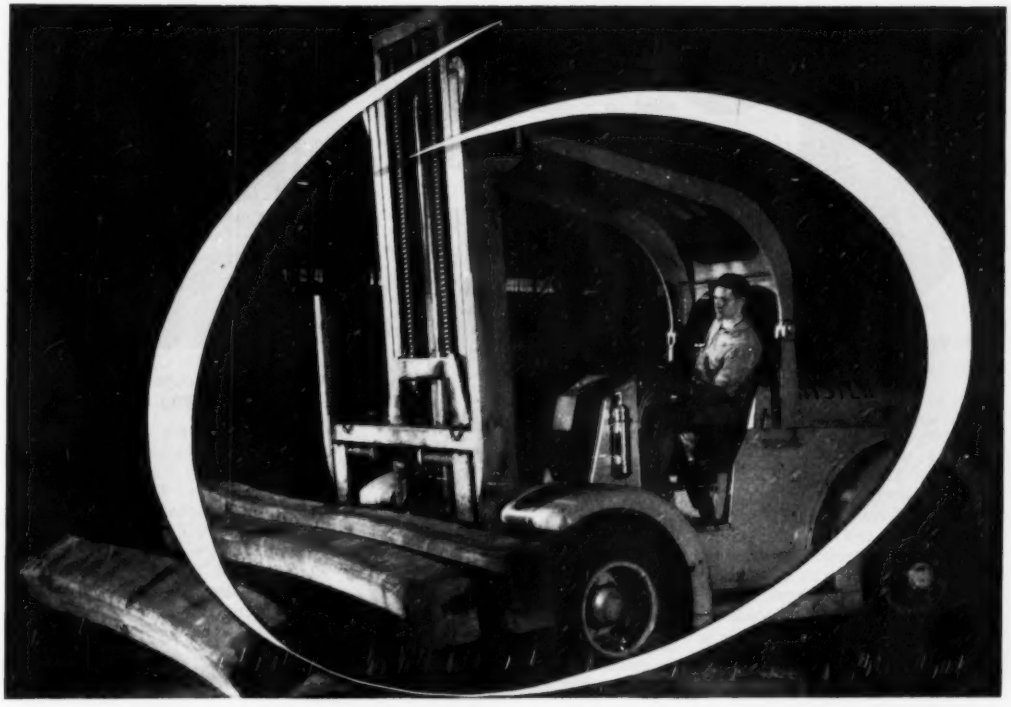
AUTOMATIC BROACH HANDLING MECHANISM available with Colonial presses (ranging from 4-ton, 24-in. stroke to 10-ton, 36-in. stroke) is said to provide increased output efficiency, reduced accidental damage to equipment, and protection of machine operator's hands when large heavy broaches are used. The equipment consists of a hydraulically-operated broach receiver (B) in the base and an automatic puller (A). Machine at left is shown at top stroke and machine at right at bottom. Trip dogs (C) cause broach puller (A) to release broach and receiver (B) lowers it clear of work—*Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich.*



Air Cylinder Control Valve Is Split Operated

Piston operated and pilot controlled, the reciprocating packless disk-type Model NFS valve directs compressed air alternately to two pressure ports for the operation of a double-acting air cylinder. The sliding self-lapping main-valve disk is shifted by a reciprocating light metal piston moved by alternately admitting line pressure to one end and venting the other. Operating with air pressures from 25 to 150 psi, this model is being manufactured in $\frac{1}{2}$- and $\frac{3}{4}$-in. sizes.

Hannifin Corp., 1118 S. Kilbourn Ave., Chicago 24, Ill.



HYSTER 150...*King of Lift Trucks*

Hyster manufactures 7 lift truck models, which have capacity ranges from 2,000 lbs. to 30,000 lbs. All are equipped with pneumatic tires. Write for literature.

HERE'S THE HYSTER that has *worked* its way to the top by cutting costs in the METALWORKING INDUSTRY. 15,000 lb. capacity. Handles anything. Pneumatic tires. Easy on the operator. Heavy duty gasoline engine. Full hydraulic braking system. 17½ ft. lift to underside of load on 42 in. load arms. Hoists, transports, tiers heavy or bulky loads—inside or outside. Want a demonstration? Or a list of users? See your Hyster distributor.

HYSTER® COMPANY

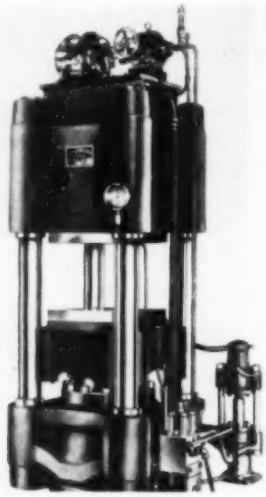
THREE FACTORIES

2902-14 N. E. CLACKAMAS, PORTLAND 8, OREGON
1802-14 NORTH ADAMS ST., PEORIA 1, ILLINOIS
1010-14 MEYERS STREET...DANVILLE, ILLINOIS

Single-Gun Welder Drives ½-in. Studs

The Graham welder is a capacitor-operated, self-timed device using tip studs which, on coming in contact with the work and fusing, cause ionization. This allows a patch for the main discharge current of the capacitor to form an arc sufficient to melt both the full diameter of the stud end and the work piece directly under it. The unit welds steel, stainless steel, monel, aluminum, magnesium, zinc, copper, and combinations of these metals. Current rating is ac 110/220/440 three phase.

Graham Mfg. Corp., 1541 E. Eight Mile Road, Ferndale 20, Mich.



Hobbing Press Attains 6350 psi Pressure

The Wood 1000-ton upmoving Hydro-Lectric press was developed for the accurate hobbing of intricate single and multi-cavity molds. It provides platen working surface of 24x30 in. A working pressure of 3000 psi is supplied to the ram by a rotary piston type pump with a 4½ gmp displacement at this pressure. By use of hydraulic intensifier, 6350 psi can be achieved. Power for the pump is supplied by a direct-connected 7½ hp electric motor.

R. D. Wood Co., Philadelphia, Pa.

50-amp Welder Contactor for Small High-Speed Machines

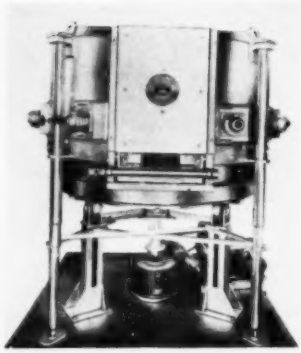
The Square D Size OW 50-amp welder contactor is for high-speed operation on small spot-welding machines up to 10 kva, 220 volts, or 20 kva at 440 volts. Two double-break contactors connected in series, giving a total of four breaks, assure high rupturing capacity. A floating armature is pivoted on a hardened steel pin. The pin bearing is hardened to insure long, trouble-free life. Shortening the armature travel, and increasing the air gap, is said to increase the magnet life of this contactor.

Square D Co., Industrial Controller Div., Milwaukee 12, Wis.

Tapered Bushing-Type Adapters Facilitate Keyway Cutting

Developed to facilitate cutting tapered keyways in straight bores, straight keyways in tapered bores, and tapered keyways in tapered bores, with standard GLENNY broaches, GLENNY tapered adapters are available in sizes ranging from ½ to 2 in. in increments of 1/32 in. They permit rapid cutting of special keyways on a production basis. They are furnished with standard tapers of ⅛ in. per foot, or ¾ in. per foot.

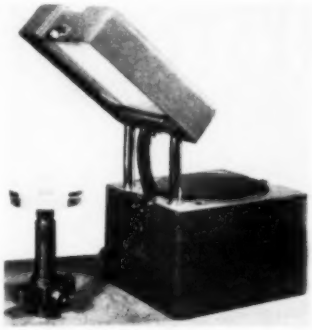
The Kase Machine Co., 1822 Buffalo Ave., Cleveland 19, Ohio.



Rotary Hearth Forge Furnace Produces up to 900 lb per Hr

With working hearth of 4 ft dia this Rockwell forge furnace is capable of producing up to 900 lb of forgings per hour heated to 2100 F. Work is charged and discharged through a single slot 9 in. wide by 2½ in. high. Slot has a water-cooled sill to prevent heat from creeping back along the bar. Heating time is from 12 to 36 min but may be easily changed to a longer or shorter cycle.

W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.



Lapmaster Unit Checks Flatness to 0.0000116 in.

Precision-measuring Lapmaster optical flats and monochromatic lights check flatness of any superfinished surface to less that one light band (0.0000116 in.). The monochromatic light, providing better than 25 foot-candle illumination on the checking surface, contains a helium gas filled tubular light recessed into the cover. This shines through a flashed opal diffusing glass. Optical flats are top-quality natural quartz. Sizes range to 6 in. in dia.

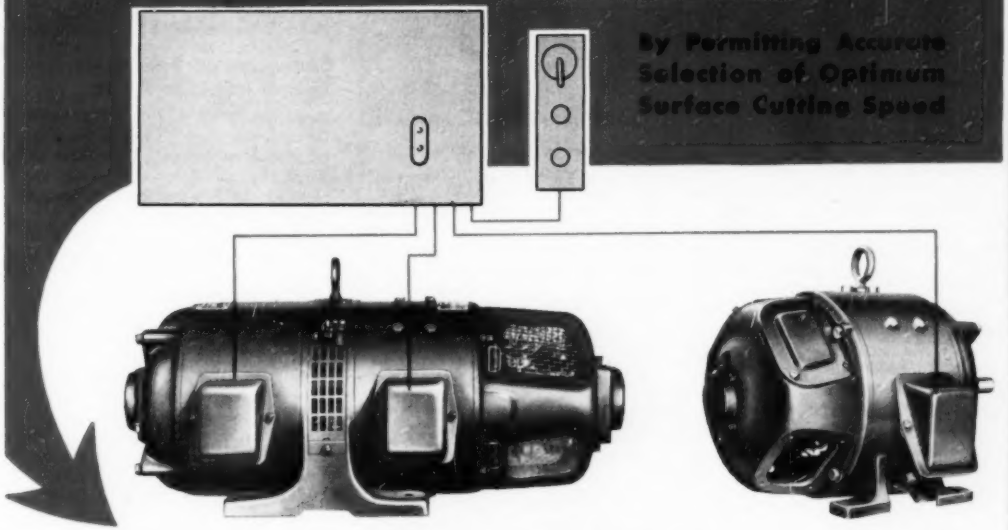
Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.

Century SELECTIVE SPEED Drive

For Operation From Alternating Current

Adds These Time and Labor-Saving Features to Your Metal-Cutting Operations —

By Permitting Accurate Selection of Optimum Surface Cutting Speed



- **Higher Production Rate**—Optimum cutting speeds provide best tool temperatures for high production
- **Less "Down Time"**—less tool grinding
- **Greater Accuracy** because of less heating of tool and work piece
- **Better Machine Finish** with more efficient cutting speed
- **Adaptable to Automatic Multiple Surface Cutting Speeds**

Century SELECTIVE SPEED Drives provide a wide range of stable speeds with fine steps of control. Eight to 1 speed ratio is standard, as much as 32 to 1 is available.

When required, these additional features are available: JOGGING — DYNAMIC BRAKING — REVERSING DIRECTION OF ROTATION — PRE-SET SPEED CONTROL.

Century manufactures a complete line of alternating and direct current motors and generators in the popular types from 1/6 to 400 horsepower. A line of gearhead motors is also available.

Call a Century motor specialist to discuss your motor drive problems. Write for literature.

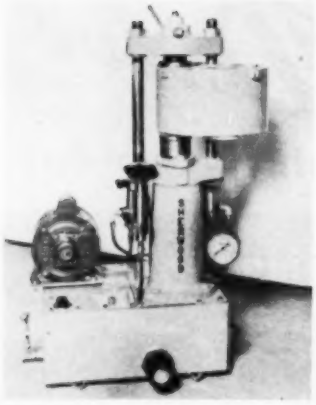
Popular types and standard ratings are generally available from factory and branch office stocks.

-635

Century C MOTORS

CENTURY ELECTRIC COMPANY · 1806 Pine St., St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

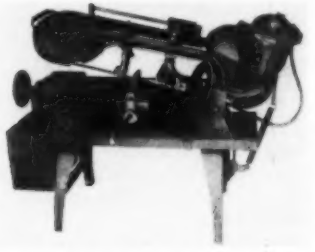


Wax Injection Press Gives Volume Production of Patterns

The Sherwood heavy-duty wax injection press is for volume production of wax patterns for industrial precision castings. The machine consists of a hydraulic pressure cylinder and a revolving drum containing either four or five wax cylinders. Wax is extruded by direct piston drive actuated by a hydraulic pump. While it is being discharged from one of the cylinders it is being tempered for future use in the others. Each container has 78-cu ft. capacity, and the double-acting hydraulic pressure cylinder is 4 in. dia. and has an 8-in. effective stroke.

Wax temperature is controlled thermostatically within 2°F of the desired temperature. Range is to 400 F. Wax pressure may vary from 100 to 1500 psi. The working height of the press is 42 in.

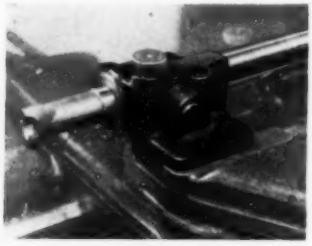
Alexander Saunders & Co., New York, N. Y.



Automatic Bar-Stock Feeder Added to Metal-Cutting Bandsaw

The Wells-O-Bar Feed Master converts horizontal metal-cutting bandsaws into fully automatic cutoff machines. By means of an air-actuated spiral roller drive, and air control of saw frame during the cutting and resetting cycle, this unit makes multiple cutting action completely automatic. Maximum length of multiple cuts is 18 in. and cuts can be made to within 5 in. of the end of the stock. A safety device shuts off the feeder on the last piece. A roller table track supports the stock. Its height is adjustable from 24 to 30 in. and it requires a floor space of 20 x 72 in.

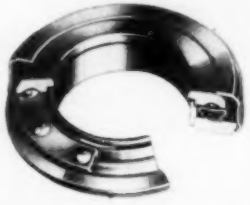
Wells Mfg. Corp., 505 Roosevelt Road, Three Rivers, Mich.



Lathe Boring-Tool Holder Provides Vertical Adjustment

The adjusting screw on the top of this boring-tool holder provides vertical adjustment for boring or internal-threading tools over a distance of $\frac{3}{4}$ in. The holder is bored to take shanks of $1\frac{1}{2}$-in. dia directly, and with split bushing it will accommodate shanks down to $\frac{1}{2}$-in. dia.

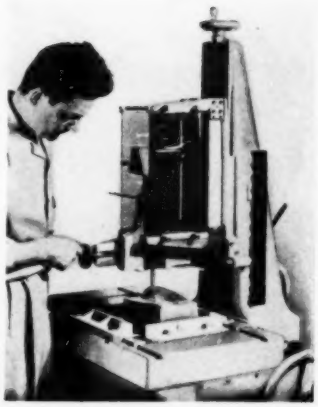
Bokum Tool Co., Detroit, Mich.



Clutch-Release Bearing Includes U-Type Grease Cage

Both angular-contact and thrust bearings are included in the wide range of sizes in the Schatz line. Superfine race finish prevents overheating of the bearing and a specially designed U-type cage traps and retains the original grease in the raceways and supplies efficient lubrication to the rotating balls without leakage. These precision clutch-release ball bearings are interchangeable with all other makes.

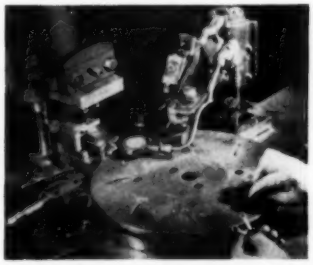
The Schatz Manufacturing Co., Poughkeepsie, N. Y.



Semi-Automatic Die Checker Records Inspection Results

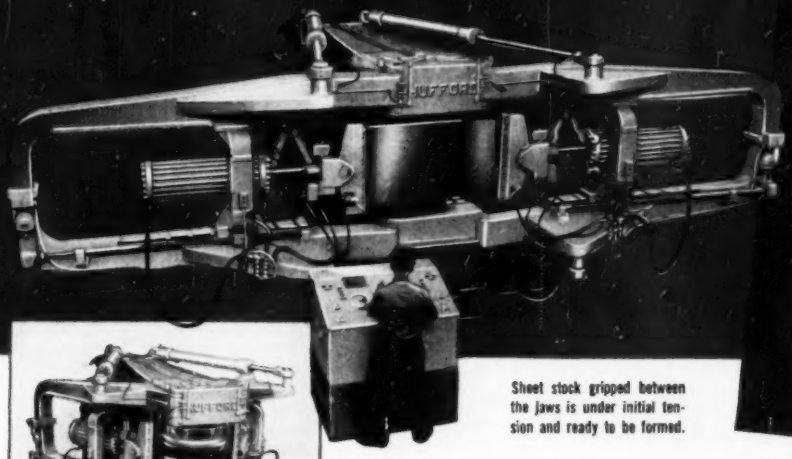
Accommodating die blocks up to 800 lb and sizes up to 22 x 14 x 12 in., the Pant-O-Scriber Die Checker gages the contour profiles, flash, and striking surfaces for forging dies and punches, and provides permanent inspection record of the die set. Finishing operations or modifications of the dies can be made without removing the die from the checker. Less than 60 seconds are required to check a section. An adjustable and interchangeable follower with 0.125 radius actuates a free-floating rotating spindle carrying a scribing cutter head which traces the die contour from the colored film of the Pant-O-Scriber glass. Up to nine sections can be scribed on each glass.

Engineers Specialties Div., The Universal Engraving & Colorplate Co., Inc., 980 Ellicott St., Buffalo 8, N. Y.



V & O FEED-O-MATIC punch press feeding device transfers parts from a nesting plate to a standard punch-press die by means of a mechanical hand or a vacuum pick-up. As the mechanical hand returns for the next piece it automatically trips the press and the finished part is ejected from the die— ***V & O Press Co., Div. of Rockwell Mfg. Co., Hudson, N. Y.***

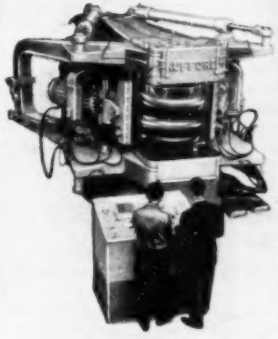
HUFFORD HYDRAULIC STRETCH-FORMING MACHINES



Sheet stock gripped between the jaws is under initial tension and ready to be formed.

Another

COST-CUTTING APPLICATION of VICKERS HYDRAULICS



Upon completion of forming operation, sheet is stretched to "set" material to die contour.

A vital factor in the economy, high production and accuracy of Hufford Hydraulic Stretch-Forming Machines is the Vickers Hydraulic Equipment used for both power and control. On the Model 50 machine shown here, the power is furnished by Vickers Balanced Vane Type pumps (two-pressure and single); all the hydraulic control valves are also Vickers. The required versatility is provided, and the control of complex movements is easy and accurate. All controls are handled by "finger touch" levers in the control panel.

Vickers Hydraulics improve the operation of many machines . . . particularly those requiring selectivity of control and adjustment to suit type of work. Any sequence of motions can be provided . . . made automatic if desired. Vickers Hydraulic Equipment is inherently self-lubricated . . . easily protected against overload. By means of interlocks, incorrect or unsafe operation can be prevented. Get in touch with the Vickers Application Engineering Office near you for suggestions on how Vickers Hydraulics can improve your machinery.

3998

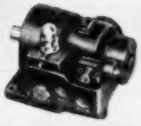
VICKERS Incorporated • **1410 OAKMAN BLVD.** • **DETROIT 32, MICHIGAN**

DIVISION OF THE SPERRY CORPORATION

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES (Metropolitan) • MILWAUKEE NEW YORK (Metropolitan) • PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Representative Vickers Hydraulic Pumps and Controls Used on Hufford Stretch-Forming Machines

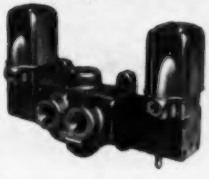


Two-Pressure Vane Pump

Rotary Pilot Valve

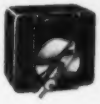
Relief Valve

Lever Operated 4-Way Valve



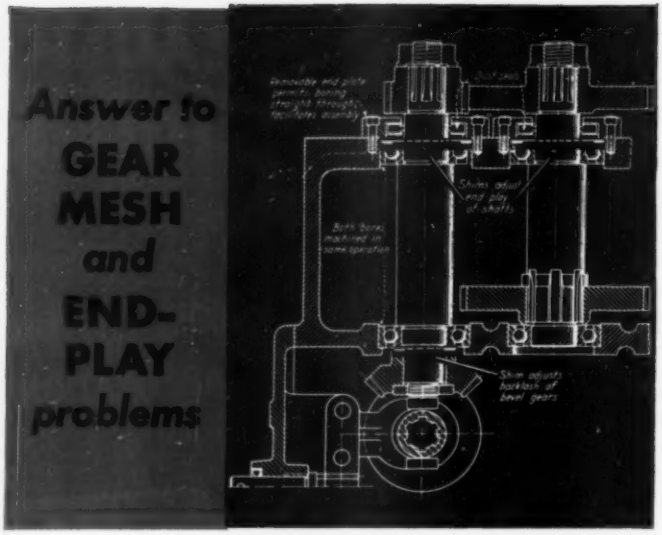
Solenoid Controlled Pilot Operated 4-Way Valve

Right Angle Check Valve



Flow Control Valve

Vane Type Pump (Single)



IF YOU'RE WASTING TIME AND TYING UP A STANDBY LATHE . . .

Laminated shims can stop the expensive process of assembly, testing, disassembly, machining a few thousandths, reassembly, retesting and so on for many costly hours.

DO WHAT THIS LEADING MACHINE TOOL MANUFACTURER DID . . .

In the milling machine above, bores for inner and outer bearings are machined to one diameter in one operation. Removable end-plate permits boring straight through outer bearing housing and makes assembly of shaft, bearing and dust seal much simpler. SAVING: hours of machining and assembly time.

AND SIMPLIFY YOUR ADJUSTMENTS BY USING LAMINATED SHIMS . . .

Backlash of bevel gear and end-play of the two shafts are adjusted right at the job by peeling .002" laminations off the shims—with a pen-knife. Shaft and end-plate dimensions are calculated for shim thickness of .052". Shims are stamped at our plant from standard .062" (1/16") LAMINUM stock. RESULT: cumulative machining tolerances of —.010 to +.020" are possible.

Send today for our new data file with specifications, design factors and applications. Sample of ***LAMINUM*** included.

STAMPING • GRINDING METALWORKING SERVICES

Press capacity to 100 tons, 24 inches square, shallow draw. Special equipment and variety of dies can eliminate die-making for short runs. Wide stock of materials. Let us quote on your *difficult* jobs.

✻ ***LAMINUM*** **(Reg. U. S. Pat. Off.) shims are solidly bonded units made up of .002 or .003 inch brass or steel laminations with a microscopic layer of metallic binder. Cut to your exact specifications.**

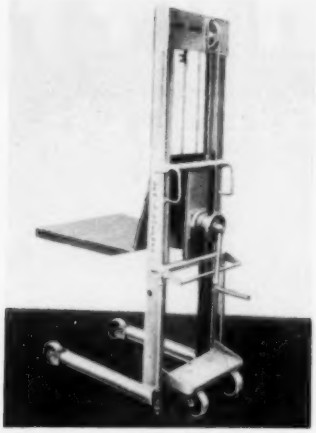
LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

LAMINATED SHIM COMPANY, Inc.

3111 Union Street Glenbrook, Conn.

SHIMS SHIM STOCK STAMPINGS AN-COR-LOX NUTS



1000-lb Load Lifted to 58-in. Height by Hand Hoist

Employing an L-S PL (planetary-gear drive) winch, raising and lowering lifting carriage 1½ in. per revolution of the crank, the "Handy Hoister" can lift 1000-lb loads to a height of 58 in. Lifting platform is 24 in. x 30 in. All wheels are equipped with roller bearings and caster steering.

Lewis-Shepard Products, Inc., Watertown, Mass.

Kennametal Tool Has Round Nose for Trough Boring

The Style 16T brazed-on Kennametal tip tool comes in two sizes: both are 1 in. wide and 12 in. long and heights are 1¼ and 1½ in. Tips supplied in either grade K6 or grade K2S are ¼-in. radius at extreme point and 1½-in. radius at each side.

Kennametal Inc., Latrobe, Pa.

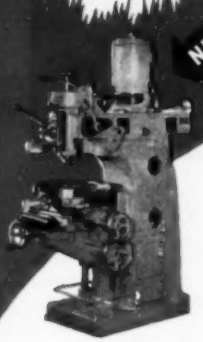
Hydraulic Lift Is Cam Actuated

The "Mobil-Draulic" lift is a combination hydraulic elevator and hand-operated four-wheel truck. It is elevated by means of a hand-operated hydraulic pump. Both motorized or gasoline-driven pumps are available with the unit. However, when hand pump is used the load may be raised to a full height of 48 in. in 80 sec. The lift may be stopped at any position within its 32-in. travel. The mechanical lock gives double assurance

Send FOR THIS CATALOG

It will acquaint you with the complete line of GORTON TRACER-CONTROLLED MACHINE TOOLS and Accessories

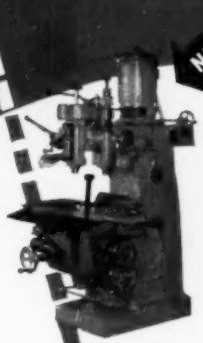
Send for your copy today. Gorton tracer-controlled milling embodies distinct advantages on the production line and in the tool room. In many cases, special tooling will make a given operation entirely automatic. Send for the Gorton Condensed Catalog illustrated above or for any of the other specialized bulletins described below — they were published for your information and reference.



NEW

0-16A Vertical

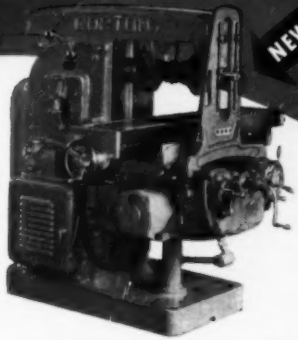
A new and improved development in a small size, sensitive vertical mill and router. Incorporates all of the desirable features of former 8-D. Also available with swivel or universal head. Request Bulletin 2240.



NEW

0-14 Duplicator

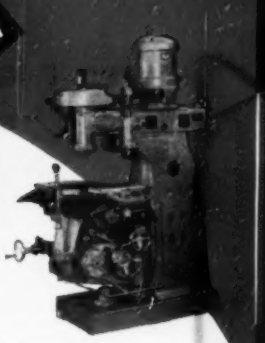
A new and better small size tracer controlled duplicator which embodies all of the advantages of the former 8-D. Rugged, versatile and extra sensitive for exacting die and mold work. Also available with swivel or universal head. Request Bulletin 1319.



NEW

2-28B Horizontal

A new contribution to production milling. No. 2 size, fullwidth plain type mill with 10 H.P. spindle drive and speeds up to 2,000 r.p.m. Built for maximum rigidity and a work horse load. Request Bulletin 2321.



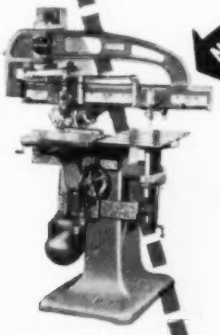
NEW

9-J Duplicator

One of the most popular and practical die and mold duplicators ever built. Rugged in construction; has *Gorton super-speed spindle and sensitive controls for the most exacting work. Request Bulletin 1319.

3-U Pantograph

The most used 2-dimensional pantograph in the metal-working field. Sturdy and rigid with sensitive tracer control. Larger and heavier 3-Z model also available. Request Bulletin 1580.



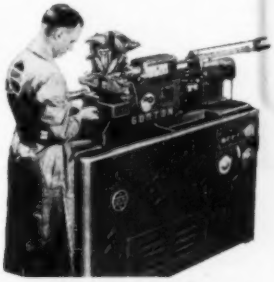
NEW

P13 Pantograph

The Gorton †Ratiobar Pantograph for 3-dimensional work offers the first basic design improvement in pantograph construction. Simpler to operate, more rigid, and accurate for small dies, molds and hobs. Easily converted for 2-dimensional work. Request Bulletin 2310.

375-2 Cutter Grinder

Universal type bench or floor models; capacity up to ⅜" dia., including ball nose and multi-flute cutters of almost any diameter, taper, shape or clearance. For carbide cutters, diamond wheels are used. Choice of tool heads and attachments. Request Bulletin 1317.



16-B Automatic Lathe

For precision turning of long slender parts from .005" dia., by 1/32" long to 7/16" dia., by 2¼" long. This Gorton Swiss-type Automatic solves many precision turning problems. Request Bulletin 1800.

*Trade Mark
Reg. U. S. Pat. Office

†Pats. Applied For

GEORGE GORTON MACHINE CO.

1511 Racine Street, Racine, Wisconsin, U.S.A.

Please Send at Once

For brief facts about the Gorton line of tracer-controlled machines, use coupon or company letterhead and request Bulletin 1655 illustrated above. For specific information on certain machines, see text accompanying each illustration.

Name.....

Title.....

Address.....State...

Dept. 1505

HY-PRO ENGINEERING increased production from 1,000 pieces per tap to 12,000 pieces per tap

PART: Check nut for air-conditioning fan blade.

PROBLEM: Stringy consistency of 1020 steel caused the 3 and 4 flute taps, used on this job, to pick up and seize often breaking the tap on the 1st or 2nd piece. Production never exceeded 1,000 pieces per tap. Did the Hy-Pro Sales Engineer think it possible to design a tap that would increase output per tap?

HY-PRO SOLUTION: Samples sent to the Hy-Pro Engineering Department were studied and tested. They suggested using a two flute spiral point tap with a special Hy-Pro finish. Manufacturer reports average production per tap now exceeds 12,000 pieces.

Above is a typical example of how the Hy-Pro Sales Engineer can help increase threaded-hole production. His expert engineering counsel backed by the most up-to-date tap production methods combine to solve tapping problems rapidly and profitably.

All Hy-Pro Taps are ground from tough uniform quality high-speed steel and given one of the Hy-Pro exclusive surface treatments.

Each tap is completely inspected by the latest electronic quality control equipment, your assurance that there will be no dimensional variance in Hy-Pro Taps of a stated size.

These precision manufacturing methods plus the ability of the Hy-Pro Sales Engineer to prescribe the correct tap for your particular job means *sustained accuracy* on your production line resulting in higher productivity from your tapping machines.

Let Hy-Pro solve your tapping problem—call a Hy-Pro Sales Engineer today.

Order from your distributor.

HY-PRO TAPS

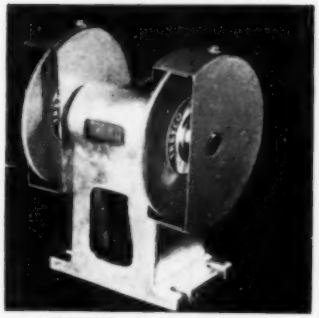
HY-PRO TOOL CO.

NEW BEDFORD, MASSACHUSETTS

A SUBSIDIARY OF CONTINENTAL SCREW COMPANY

against possible incipient leaks in the hydraulic circuits. Over-all length of the lift is 11 ft, and width, 4 ft. It can be obtained in 500, 2000, 4000, and 6000 capacity models.

The Lange Co., Milwaukee, Wis.



Treyco Grinding Stand Adds Life to Wheels

With center line of the shaft only 1 in. back of the front of the base, allowing free movement of the sharpening fixture, the Model 300 grinder stand is said to provide 25% greater life of the grinding wheel. The stand sells for $14.95, including 23-in. V-belt. Two guards are $6.

Treyco Products, Buffalo 17, N. Y.

6-in. All-Metal Slide Rule Contain Sixteen Scales

With optical tongues and grooves machined to 0.001-in. accuracy, the 6-in. Model 300 Log Log duplex slide rule has a magnesium alloy body. C-D scales on both sides of the rule together with folded and reverse scales speeds figuring and avoids going off-scale. Fourteen additional models have been developed to meet specific requirements. Encased in genuine full leather pocket case, the rule is priced at $6.75.

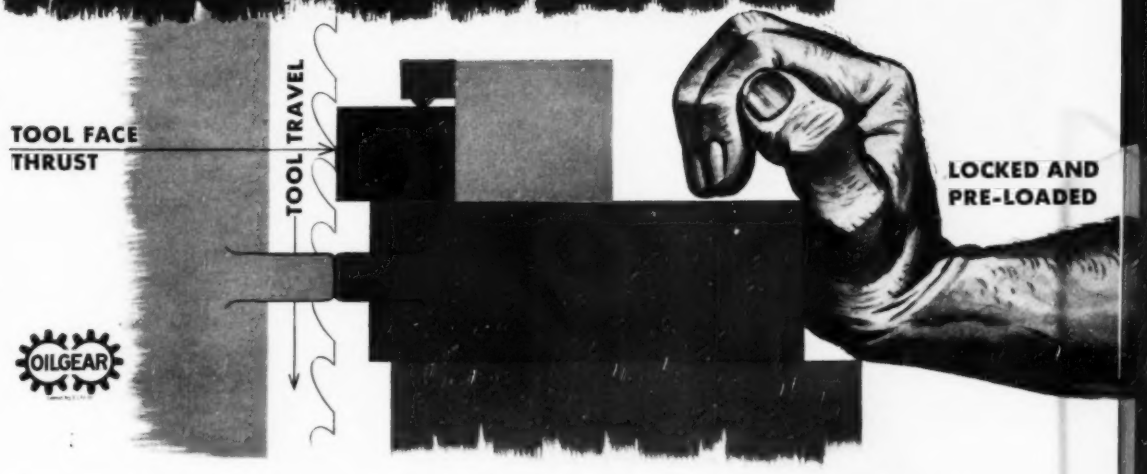
Pickett & Eckel, Inc., 5 S. Wabash, Chicago 3, Ill.

Soft Malleable Abrasive Said to have Longer Life

A special treatment of the carbon is said to give Permabrasive shot and grit for metal cleaning a softer more malleable body. Because of its softer body, this shot and grit retains its original impact value longer, extending its useful life before final breakdown. It is also reported to cause less abrasion on machines and parts.

National Metal Abrasive Co., Cleveland, Ohio.

YES! You can maintain closer broaching tolerances with Close Pre-Loaded Work Tables



If your broached parts are not being finished to consistently close tolerances and flat surfaces, it is evident that the table operating and holding mechanisms on your broaching machines are yielding to tool face angular thrusts. It is equally obvious that *NO* table which is *NOT* pre-loaded and thus rigidly held in broaching position can withstand these forces without deflection.

This is a broaching problem which Oilgear has solved with its patented and exclusive work table shuttling mechanism which both *locks* and *pre-loads* the tables in broaching position. Under peak tonnage tool face thrust there is no measurable table deflection. Parts are held firmly in broaching position and do not yield to varying broaching tool forces. Consistently close tolerances and true flat surfaces are easily maintained.

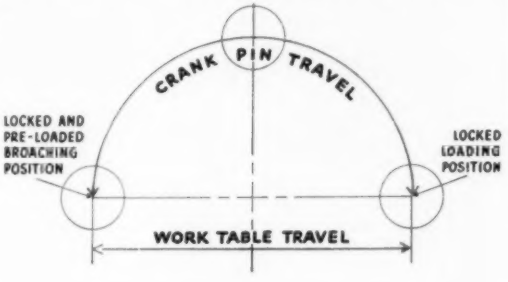
INTERLOCKED TABLE MOVEMENTS

Oilgear work table movements are *interlocked* hydraulically, electrically and, in the double slide machines, also mechanically, for positive sequence operation with tool slide. *No cycle malfunctioning is possible.* There are no valves to constantly adjust or maintain. There is no complicated switch arrangement to adjust or maintain. For the table interlock, Oilgear uses only *one* limit switch, only *one* relay.

HARMONIC TABLE MOTION

Oilgear's fluid power, direct ram-actuated, heavy-duty crank mechanism shuttles work table to and from broaching position at controlled high speed. Cushioned, 180° harmonic motion of crank eliminates starting and stopping shocks and positively locks table under pre-load in broaching position. Parts do not have to be clamped before table moves. Automatic clamping and unclamping of work is easily applied.

DIAGRAM ILLUSTRATING
HIGH-SPEED HARMONIC TABLE MOTION



OTHER FEATURES

These and other features such as long table travel for straddle broaching, hardened and ground ways with adjustable gibs which prevent tilting and automatic pressure lubrication to vital points also contribute to the outstanding performance of Oilgear Surface Broaching Machines. Write for descriptive bulletins. THE OILGEAR COMPANY, 1563 W. Pierce St., Milwaukee 4, Wis.

Oilgear Fluid Power

BROACHING MACHINES AND BROACHING FIXTURES

Are You Paying Too Much for Precision?

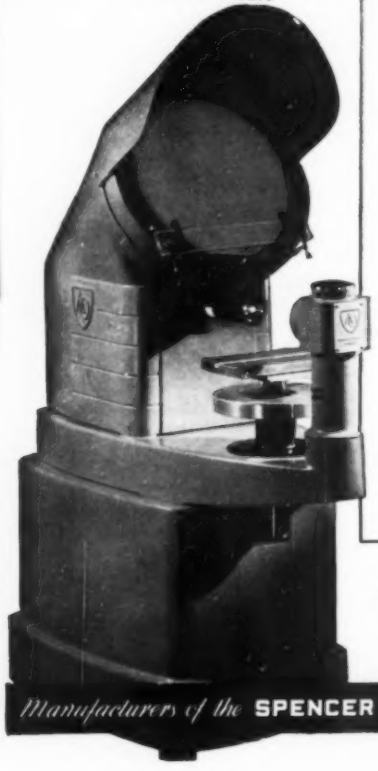
You can cut labor costs, reduce scrap, and maintain closer tolerances with the

NEW AO OPTICAL PROJECTION COMPARATOR

Here is an instrument so advanced in accuracy and convenience that it opens new possibilities for optical projection comparison in parts inspection and tool and gage measurement. Developed by one of America's most respected builders of scientific optical instruments, the AO Comparator offers many long-sought features:

The basic AO Comparator speeds inspection of parts on the production line. For mounting on a bench, it is available without the portable base.

For further information, write Dept. U157



Uniform Magnification Without Distortion
for unequalled measuring accuracy.

Greatly Increased Illumination
valuable advantage at all magnifications.

Coated Precision Optics
for crisp definition, brilliant image contrast.

Cool, Sturdy Lamphouse
Forced ventilation throws heat down away from operator.

Choice of Magnifications
Objectives quickly interchangeable without adjustment.

Mirror—Factory Positioned
No adjustments needed.

Bulb—High Intensity, Prefocused and Precentered,
changed without adjustment.

Light Weight Cast Aluminum
Easily moved on retractable casters.

Efficient Work Table
Rapid fingertip focusing, with 4" vertical travel.

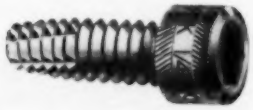
American Optical
COMPANY
Scientific Instrument Division
Buffalo 15, New York

Manufacturers of the **SPENCER** *Scientific Instruments*

Dry Plastic Protects Highly Finished Metals

A dry non-tacky plastic,, mar-proof coating which protects pre-polished or highly finished metals from damage during die or roll-forming operations, or machine handling, has been developed by the H. A. Montgomery Co. It is applied to metal surfaces in cold-water solutions by spraying or roiling. The film dries hard and tough with extreme rapidity at slightly elevated temperatures. It is said to afford substantial rust-proofing on ferrous metal parts when left on after fabrication. The film may be removed quickly and easily with mild alkali solutions.

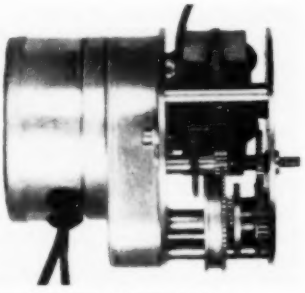
The H. A. Montgomery Co., 17191 Swift Ave., Detroit 3, Mich.



Socket-Head Cap Screw Eliminates Tapping Operation

The P-K self-tapping socket-head cap screw cuts a thread in a plain drilled hole in metals or plastics as the screw is turned in, eliminating tapping operations. According to manufacturer these screws can be readily removed and replaced in the same hole any number of times without reducing their holding power.

Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.



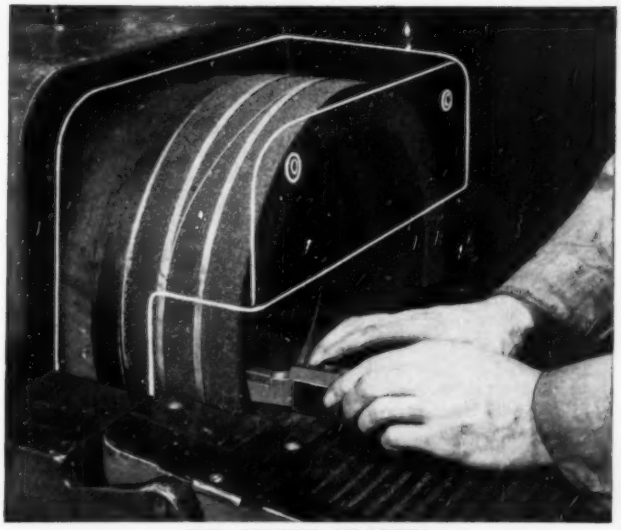
Synchronous Motor Unit Contains Differential Clutch

The SXC synchronous motor and differential-clutch mechanism is designed to meet the needs of timing, recording, indicating, and switching applications requiring an accurate reset operation. The motor produces 30-in oz torque at 1 rpm. The clutch unit consists of a differential, internal-tooth planetary-gear system with

BUXITE

GRINDING WHEELS FOR CARBIDE TOOLS

LIGHTER FEED... COOLER CUTTING



THE BUXITE PROCESS

(Formerly Controlled by The Bridgeport Safety Emery Wheel Co., Inc.)

The Buxite Process is a revolutionary method of coating **each individual grain** of Buxite wheels with a microscopically thin shell of carbon in an isotropic vitrescent form. Each shell permits its grain of abrasive to turn, exposing every cutting surface before it is worn away. Each succeeding layer of grains are contained in their individual carbon shells, assuring constant grinding action during the life of the wheel.

REPRESENTATIVES NOTE: There are a few desirable territories available to well qualified representatives. If you are interested, write us, giving full particulars of your operation and qualifications.

Buxite grinding wheels perform better and actually cut faster with light pressure. This means that carbides and other superhard steels can be ground with less heat being generated . . . which prevents checking and cracking, lengthening the life of the tools.

GRIND CARBIDE TOOLS AT 75% TO 85% LESS COST

Not only do Buxite wheels increase carbide tool life, but they give a cleaner grind and better finish. Buxite wheels do not "load" when grinding sintered tools, eliminating frequent stops for dressing, and the hard-shelled grains makes the life of each Buxite wheel 4 to 6 times that of ordinary wheels.

REDUCE DIAMOND WHEEL CONSUMPTION

The lighter cuts and cooler grinding action of Buxite grinding wheels results in excellent finish on Tungsten Carbide and other types of superhard alloys. Buxite wheels always reduce and frequently eliminate the need for diamond wheel grinding on this type of tool This saving in diamond wheel consumption and costs is an important reason so many manufacturers and metal working shops have standardized on Buxite wheels for their tough grinding operations.

ADDITIONAL ADVANTAGES OF BUXITE WHEELS

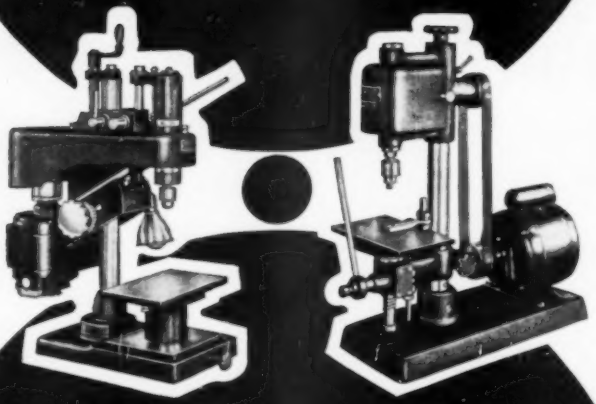
Every feature of Buxite wheels contributes to faster production and lower piece cost on grinding operations involving super-hard tool steels. Faster, cooler cutting action, longer tool life, longer wheel life and reduction or elimination of diamond wheel consumption result in greatly lowered costs. If our representative has not called recently, write direct to us for additional information and money-saving facts.

MANSCO GRINDING WHEEL CO.

2164 EAST 36TH STREET CLEVELAND 15, OHIO

Exclusive Suppliers of BUXITE *Grinding Wheels*

SMALL PRECISION HOLES
DRILLED ● TAPPED
AT LITTLE COST



Hamilton Varimatic Drilling Machine.

Hamilton Precision Tapping Machine.

The "Hamilton" line of four small hole, precision drills were developed for tool room use and built to the requisite tolerances. In use, they were found to be so brawny that they rapidly found their way into production.

During the years of their use on production work they have been proved to "stand up" under heavy production loads and to maintain their accuracy.

Eighty percent of the present sales of these machines are repeat orders.

The Hamilton Small Hole, Precision Tapper is the ideal companion tool to the "Hamilton" line of drills. It incorporates the same stamina and is built to the same tolerances.

Unsolicited letters from users are enthusiastic in appreciation of this machine's many exclusive features.

DESCRIPTIVE LITERATURE ON REQUEST

The time you spend in investigation of these machines will be paid for in production gains.

THE Hamilton TOOL COMPANY
SUPER SENSITIVE DRILLING MACHINES · TAPPING MACHINES · POSITELVATORS
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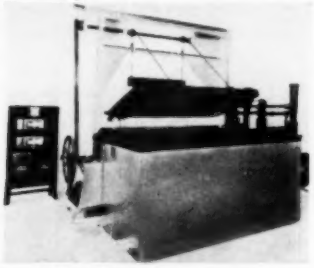
the sun gear directly coupled to the motor and the planet gears to the output. When locked by energizing an electromagnet, the internal gear causes the motor to drive the output shaft. Thirty-nine output speeds are available from 15 rpm to ¼ rpd.

R. W. Cramer Co., Inc., Centerbrook, Conn.



Gas-Fired Salt Bath Descales Stainless Steel

Portable I-beam-based salt bath for descaling stainless steel parts is heated by two immersion tubes equipped with air-operated eductors to around 930 F. The unit is encased in a heavily insulated steel shell. Motor-driven hinged lid covering the top is equipped with limit switches and up and down pushbutton stations, or may be operated manually. The unit can be fired with natural, artificial, or any of the LP gases.

James H. Knapp Co., 839 East Fourth St., Los Angeles 13, Calif.

"One Shot" Lubricator Gives Close-Control Oil Feed

The LPM lubricator is a small compact sump-mounted unit recommended for closely controlled but infrequent oil feed operations. The lubricator is piston type and is equipped with a filter to prevent foreign particles from entering the system.

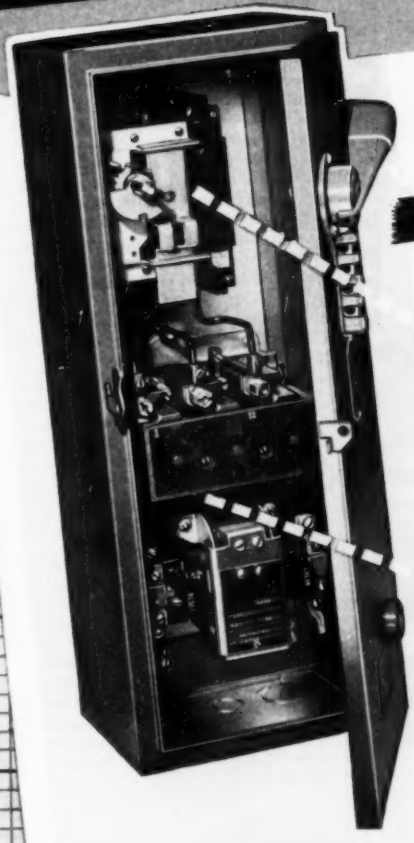
Bijur Lubricating Corp., 43-01 Twenty-Second St., Long Island City 1, N. Y.

Circuit Breaker

Square D Combination Starter

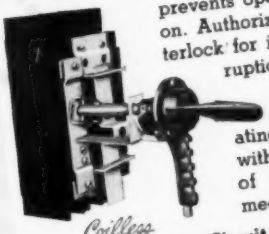
NEW DESIGN FEATURES

INSIDE AND OUT!



This combination starter gives you ①increased operator safety ②repeat circuit protection and ③longer motor starter life.

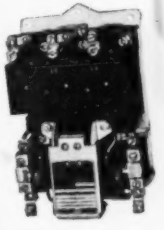
NEW Circuit Breaker Operating Mechanism



provides maximum operator safety. Interlock prevents opening door when disconnect is on. Authorized person can release door interlock for inspection without power interruption. When door is re-closed, self-aligning handle indicates true position of disconnect. Operating handle can be locked on or off with one, two, three, or four padlocks of varying sizes. Handle-locking mechanism also locks door.

Coilless Thermal Magnetic **Circuit Breaker** is non-tamperable, gives repeat protection, can be quickly re-set by anyone. Nothing to burn out—nothing to replace.

NEW Features Added to Magnetic Starter Design



Square D's time-proven design has always provided easy installation, simple maintenance and long life. Now, even longer life is assured by straight line, guided motion of armature and movable contact assembly which eliminates bearing and reduces wear. For added convenience and flexibility, Square D starters now have NEMA standard mounting and wiring.

Square D's packaged parts simplify normal maintenance and minimize replacement part ordering and stocking problems.

Write for Bulletin 8539, SQUARE D COMPANY, 4041 N. Richards St., Milwaukee 12, Wis.

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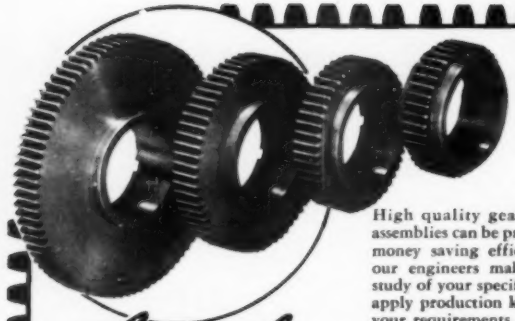

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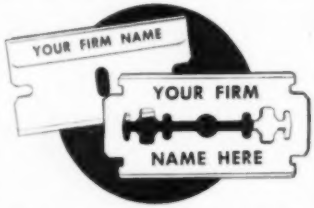
A DAILY REMINDER



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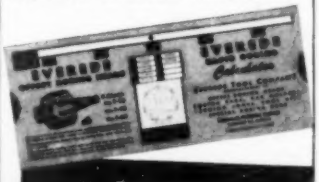

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NEW BOOKS

METAL CUTTING TOOL HANDBOOK—*647 pages. Published by the Metal Cutting Tool Institute, 405 Lexington Ave., New York 17, N. Y. Price $6.50.*

Seven important types of metal-cutting tools are thoroughly explained with respect to types and usage, operation and maintenance. These types of tools are: twist drills, reamers, counterbores, taps and dies, milling cutters, hobs and gear shaper cutters, and broaches.

The scope of the book can be seen from analysis of the 90-page section on drills. After covering the nomenclature and definitions of drills and standard sizes, a very valuable and well-illustrated discussion is given of nearly 40 distinct types of drills. Here the use of good halftone illustrations printed on high-quality paper, plus well-written descriptions and application data, provide the engineer, machinist, apprentice and purchasing agent with a much better grasp of the wide variety of drills available.

In further discussion of twist drills, the reader is given detailed information on driving devices, plus sketches of more than 20 modifications that can be made in straight and tapered shanks. Data on cutting speeds, horsepower and thrust, cutting fluids, chip breakers, drilling various materials, sharpening, types of drill points, and common troubles and causes round out the section.

The same thorough treatment is also used for the other six sections on tools. Another 148 pages are devoted to engineering data and index. Unquestionably the handbook is a credit to the efforts of the engineers connected with the metal-cutting tool industry, and should be in the hands of all those who specify and purchase metal-cutting tools. The book should also be made available to men in the shop.

•

BALL AND ROLLER BEARINGS—*By P. H. Billington. Published by Emmott & Co., Ltd., 31 King St. West, Manchester, England. 161 pages. 5x7 in. Price four shillings and sixpence.*

This latest addition to the series of Mechanical World Monographs deals briefly with the various types of ball and roller bearings available and goes on to discuss the types of loads to which they may be subjected. En-

NEW "QUICK-LOCK" ADJUSTABLE ADAPTER ASSEMBLIES

for multiple spindle machines

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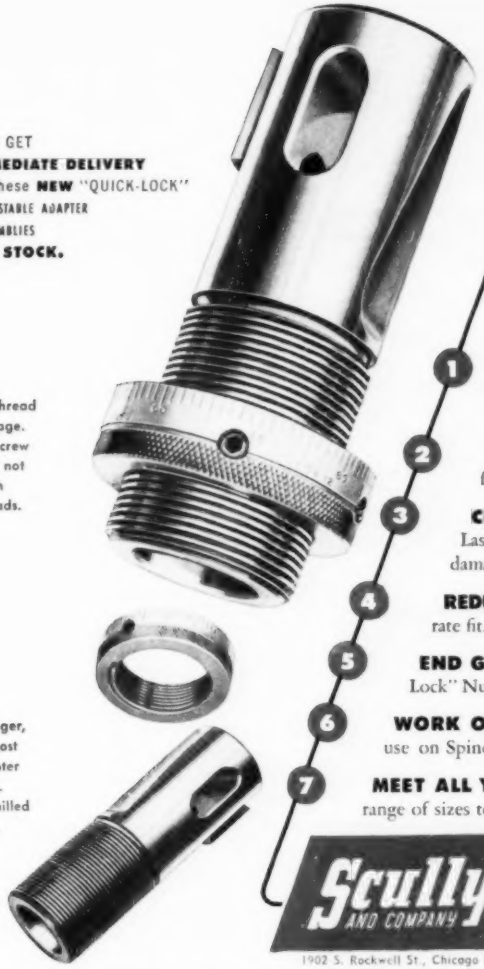
YOU GET **IMMEDIATE DELIVERY** of these **NEW** "QUICK-LOCK" ADJUSTABLE ADAPTER ASSEMBLIES FROM **STOCK.**



No thread damage. Set screw does not touch threads.

Stronger, low cost Adapter body. No milled slots.

Your initial cost, set-up time, replacement costs and other economy factors were considered in the design and manufacture of these *New* Scully-Jones "Quick-Lock" Adjustable Adapter Assemblies, that give you seven money-saving benefits.

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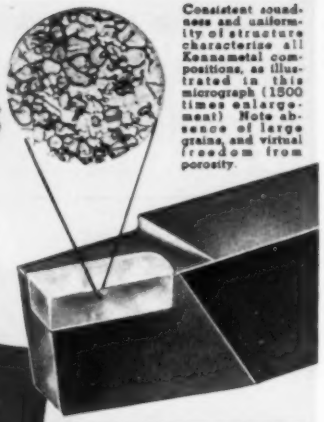


Consistent soundness and uniformity of structure characterize all Kennametal compositions, as illustrated in this micrograph (1500 times enlargement). Note absence of large grains, and virtual freedom from porosity.

Assures CONSISTENT PERFORMANCE

Slight variations in the uniformity of the structure of a tool material will result in big variations in performance. Uniform soundness is a distinguishing characteristic of every Kennametal composition. For example:

The variation in consistency of hardness of Kennametal is within the limits of accuracy of testing methods. This applies to tests on different areas of any one tip, or of different tips of the same Kennametal grade. This high standard is maintained by precise scientific control of distinctive manufacturing processes.

What is this worth to you? Just this—the more we put into Kennametal—the more you get out of it. The brief performance reports at the right are typical. But—the surest way we can prove Kennametal—is in your shop—on your job. Ask our nearest field engineer to demonstrate.

TOOL COSTS CUT 98%

Boring Cast Iron

This manufacturer increased production on finish boring of cast iron hubs from 100 to 4000 between grinds, and from 1000 to 60,000 pieces per tool, by replacing the previously-used carbide with Kennametal Tools having K8 tips.

TOOL LIFE 7 TIMES AS LONG

Boring Steel

A solid Kennametal Style 27SR tool bores an average 174 flame-hardened flanges before regrinding, as against 25 pieces for the carbide previously used.

SOLVES INTERRUPTED CUT

Tough Cast Iron

Excessive tip breakage of brazed carbide tools due to interrupted cutting on cast iron caused major production delays. Use of Kennametal Clamped-on Tools having K1 tips, eliminated tip breakage. At slower SFM (150 to 134), and greater feed (.074" instead of .031"), production rate was doubled.

MACHINING TIME CUT 83%

Cast Steel

With HSS tools it required 12 hours to machine a single drum from a sandy steel forging (260 Brinell), having interruptions. Now, Kennametal Tools with K2S Clamped-on tips, turn out 6 drums in the same length of time.

KENNAMETAL *Inc.*, Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

tirely practical in outlook, it discusses the methods of calculating bearing loads, the selection of suitable bearings, and the various methods of installing them. Useful tables of limits for bearing seatings and housings are given for both inch and metric sizes. Types of seals and methods of lubrication are discussed at some length. The book closes with a number of specific examples of bearing applications showing the calculations necessary to determine the loads on various elements.

Although not intended as a complete treatise on the subject, it will be found extremely useful for the engineer who requires up-to-date information and notes on modern practice.

•

TRAITE THEORIQUE ET PRATIQUE DES ENGRENGAGES (THEORETICAL AND PRACTICAL TREATISE ON GEARS)—*By Henriot. Published by Dunod, 92 Rue Bonaparte, Paris 6, France. Price 1950 Francs.*

Published in the French language, this is the first of two volumes on gears. It includes information for both shop and engineering men on such phases of gearing as vectors, pitch surfaces, tooth contact, profile corrections, loading, efficiency, shafts, and gear trains.

•

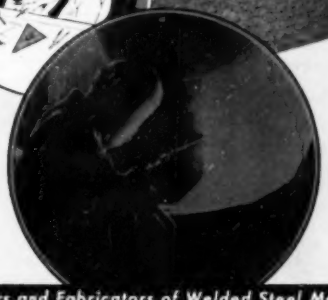
ANALYSIS AND LUBRICATION OF BEARINGS—*By Milton C. Shaw and E. Fred Macks. Published by McGraw-Hill Book Co., Inc. 330 W. 42nd St., New York 19, N. Y. 618 pages 6x9 in. Price $10*

A highly technical and advanced work presenting the many aspects of bearing analysis. In this book the external conditions imposed upon shaft bearings are considered in detail and are integrated with lubrication theory. The general principles of bearing load are first developed, then representative examples are discussed. Dimensional analysis is introduced to generalize the results of bearing-load computations and lubrication theory.

Several chapters are devoted to the principles of hydrodynamic lubrication, followed by a discussion of rolling-contact bearings. The many variables of importance in boundary lubrication are considered next, and the final chapter is devoted to a brief description of a representative group of bearing-test machines.

The book will be of value to the practicing engineer as a reference work, and as an engineering text to the advanced student.

Steel-Weld FABRICATION



These huge gas seal hoods for blast furnaces, formerly produced in steel casting form, are now Steel-Weld Fabricated to eliminate pattern costs and achieve greater strength with less weight. They were produced and completely machined within the Mahon organization. This is typical of thousands of Steel-Weld Fabricated parts and assemblies produced by Mahon for customers throughout the country. Mahon offers to you an unique source for welded steel in any form regardless of size or weight . . . complete facilities for engineering, fabricating and machining . . . a source from which you may expect a smoother, finer appearing job, embodying every advantage of Steel-Weld Fabrication.

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The Lovejoy man near you will be pleased to give details and production estimates on your own work.

"TOOL BITS"

Type "A" face mills are available for all standard arbor mounts (National and Lovejoy) and standard spindle mounts (National, Ingersoll, Universal, Giddings & Lewis and Lucas). Details will be found in Lovejoy Catalog No. 28. If you have unusual jobs requiring special cutter designs, call on Lovejoy the "specialists on specials."

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

Write for Catalog No. 28

ROUND TABLE Discussion

THE LOST THOUSANDTH

PRESUMABLY Ed's plant is situated back of beyond, where repetitive work would be uncommon and blueprints rare. This pre-supposes that it was not usual to work to gages, one piece being fitted to the other. If so, one could think a solitary thousandth would be a lonely little chap whose loss would be as unimportant as its presence. It could exist but, almost in the abstract, to be allowed for, plus or minus without fuss.

Would it be right to suggest that it is not in this kind of plant where the odd thousandths go astray but rather in those where both jobbing and quantity work is done? In these, and it may be because of the mixture, the most amazing practices can be found. In one plant with which I became connected a few years ago, it was the custom for any foreman to alter drawing dimensions at will. The results, as would be expected, were far from what the designer had visualized. But the dimensions were always in accordance with those on the drawing at the moment.

During the recent war, I had to go to another plant to investigate some unaccountable variations from drawing dimensions. I was told that they looked upon the drawing as a rough guide to be modified, if desired, to suit the forgings.

In each case, the people were told that drawing dimensions had the sacredness of the Bible. Neither additions, alterations nor deductions were permitted except on the authority and over the signature of the designer. Some people squirmed, but the evil was cured. Should any figure not be clear, it had to be referred for confirmation. Failure to do so became the entire responsibility of the individual using it, and, like the Bible, drawing dimensions became inviolate and the characters of the smither's or the engineers were never brought into question.

P. E. James
Lincoln, England

•

HARD SENSE OR HARD HEAD

The wise shop foreman, manager, or director will make the fullest possible use of the skill and brains available on the plant, no matter in whom those qualities are to be found. The managing director should not

ARE WOMEN SMARTER THAN MEN?
I DUNNO— WHY?
OUR COMPANY BUYS CUTTING TOOLS FROM 8 DIFFERENT MAKERS- MY WIFE SAID IF SHE BOUGHT GROCERIES AT 8 DIFFERENT PLACES, I WOULD HAVE TO HIRE SOMEONE TO KEEP HOUSE FOR HER!
WONDER WHAT HE MEANT?

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• You can save time in purchasing, in requisitioning, in stock keeping, in the tool crib when you specify Standard Shield Brand cutting tools. One responsible maker gives your requirements top attention. The Foremost Quality of Shield Brand Tools gives you top performance, attested by the fact that American mass production industries—automotive, aviation, farm implement, railroad, electrical and home appliance—regularly specify and use these fine tools. Their selection is based on merit alone.

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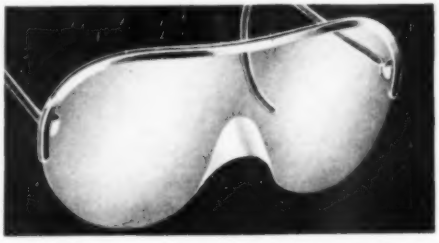

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Here is comfort in nine-tenths of an ounce. WILLSON FeatherSpecs* with a large, overall plastic lens rest lightly on the nose and can be worn all day—even over prescription spectacles—without fatigue. Workers say they hardly know they are wearing any eye protection. Yet they prove adequate protection on many jobs such as light grinding, woodworking, spot welding and inspection of work in process.

If you want your investment in safety equipment to pay off—don't neglect comfort in your specifications.

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In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!

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be above enlisting the help of the shop laborer if he has a worthwhile contribution to make, as a consequence of knowledge gained in previous employment or in pursuit of a spare-time hobby or occupation. The approach should be made, even if hope of success is only suspected. If a helpful contribution results, a money payment should be forthcoming if the service rendered is definitely out with the scope of the work which the shop laborer was engaged to do. That goes for the shop foreman and manager also and indeed for all executives who, after all, are expected to put the interests of the company before personal interests or pride.

In conjunction with a suggestions scheme, some firms run a "hard nuts" feature and a list of problems on hand are posted beside the suggestions boxes in each department. The headings vary—"Hard Nuts—Can You Crack One?" was seen recently in a small plant making agricultural machinery.

In a large Clyde shipbuilding yard where the writer was employed some years ago, the general manager placed great confidence in encouraging all ranks to help out with difficult problems. Every Friday afternoon he gathered the head foremen of each department in his room where a hand round cup of tea and chocolate biscuits were on tap, along with cigarettes and pipe tobacco. The object of the meeting was to discuss production problems, nothing more. It was well advertised throughout the yard that useful suggestions would be generously rewarded and a list of problems awaiting solution was displayed in each section of the shops and yard.

Shop foremen and leading hands were charged with the duty of reporting problems to the head foremen who carried them to the weekly meeting with the general manager, where they were sifted and listed for presentation in the works. The head foreman, along with the executive concerned, discussed with any employee interested in offering a solution, the why and the wherefore and was responsible for having the suggestion tabled at the general manager's meeting.

An example. A 22,000-ton P & O ship had to have gun turrets fitted on the main deck. The base of the gun seat was about 3-ft in dia. Deck plates are not straight and level, and chipping the gun seat to bed on the deck was a long and costly job. The solution came from a fitter who usually bored out the propeller-shaft bracket, in place, with a portable boring bar and motor, through worm

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TO GEAR BUYERS

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West Springfield, Massachusetts
Springfield 7-4751

gear. His suggestion was to use the boring bar in a vertical position and face a strip 3 ft dia by 7 in. broad on the deck plates. The base of the gun seat was then faced in a lathe and no hand work was required. From memory, the comparable times were, suggestion method, ten hours, chipping and bedding by hand, 60 hours. The suggestion method was, of course, a much superior job in addition to being much quicker.

C. D. Mackinnon
Airdrie, Scotland

•

TEN O'CLOCK SCHOLAR

In some individuals, the habit of unpunctuality is so firmly rooted that it has become a vice, and like all vices it becomes costly to the victim and those who associate with him. In the shop in which production minutes are important, punctuality in reporting for work is just as essential as having the proper tools and equipment to do the job, especially where tight delivery schedules must be maintained. Most of us have worked in shops of this type, where delivery dates must be strictly adhered to—or else. We know from experience that a man of the Harry Mullins type just doesn't fit into such an organization, because he can't be depended upon to be Johnny-on-the-spot when his particular operation is required. He may be an expert mechanic when on the job—but a dependable man of lesser ability would be more profitable to the shop in the long run.

If we take a look at this problem from the morale viewpoint, we must consider the effect of this man's disregard of shop procedure on his fellow workmen. Naturally, they are not blind to the fact that this man can come to work "whenever he feels like it," and can offer any paltry excuse for his slackness.

To my mind, talk of educating men like that to be more efficient in their personal affairs is mere wishful thinking, because the average foreman just hasn't got the time to do it, even if he knew the correct approach to what I think is a psychiatric problem. Where a grown man is concerned, I think what an oldtime foreman I know calls "the one, two, three and out" method is the only remedy for such as Harry Mullins. In other words, give him three chances to mend his ways; if they fail, let him go. As the old man expressed it, "It saved wear and tear on my disposition, and also served notice on the boys in the shop that I'd tolerate no monkey business."

Where the younger element in the shop was concerned, he wasn't so

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It takes tough drills to handle tough drilling jobs! It takes SKIL Drills! They're built for day-in day-out punishment. They have the power, the handling ease, the drilling speed to make every job easier, faster and better. Ask your SKIL Tool Distributor to show you how SKIL Drills will solve your drilling problems. 26 models to fit your needs . . . to save your time and money.

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5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD.
66 Portland St., Toronto, Ont.

ELECTRIC **SKIL Tools** PNEUMATIC

SKIL Tools are made only by Skilsaw, Inc.

Features Like This Make SKIL Drills Right for You!

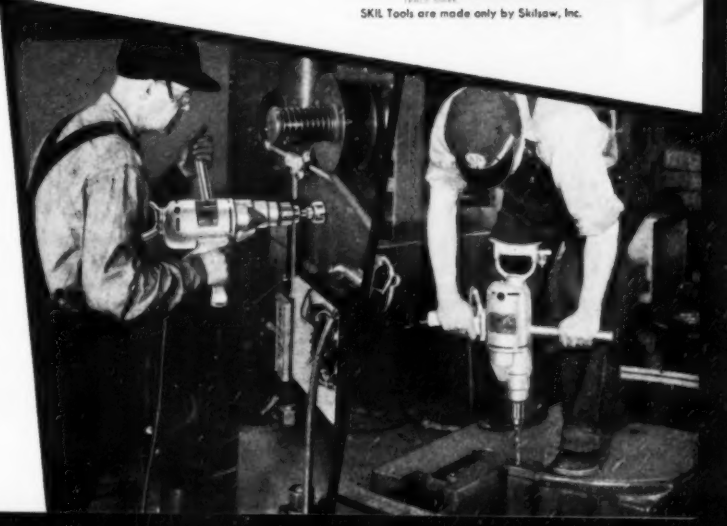
Powerful, Universal Motors—Balanced, dynamically and statically for smoothest, most dependable operation.

Helical Cut Gears—Precision cut for quiet running and long life.

Bearings—Top quality bearings minimize friction, eliminate vibration.

Aluminum Alloy Body—High-strength, die-cast housings give greater sturdiness and accuracy in fit.

Perfect Balance—Compactness and perfect balance in every SKIL Drill provide maximum handling ease in all drilling positions.



Instantaneous Coolant Flow

with

RUTHMAN GUSHER COOLANT PUMPS

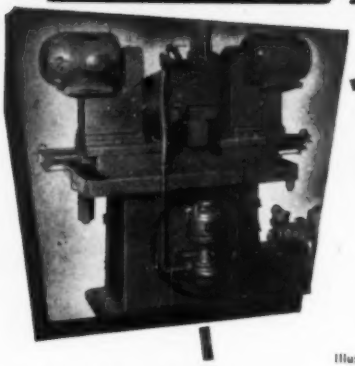


Photo Courtesy The Gardner Machine Co.

Illustrated is a typical installation of a Ruthman pump on a Gardner #77A-12" Double Spindle Grinder. The specific pump illustrated is a Ruthman Model 11022.

There is no waiting with Ruthman Gusher Coolant Pumps. From the moment the machine starts you get copious coolant flow that can be controlled in a split second from a trickle to full volume. Ruthman Pumps do not build up pressure when throttled, there is no priming or packing needed.

Join the thousands of metal-cutting machine operators all over the country who know by experience that Ruthman Pumps give them better, more efficient service and long trouble-free life.

Write for literature today.

THE RUTHMAN MACHINERY CO.

1818 READING RD. CINCINNATI, OHIO

harsh. Before he would give an apprentice boy a talking to, he would pass the word to the boys to "serenade" the tardy one. The procedure was this. When the latecomer entered the shop, the boys would pick up a wrench or hammer and pound on a machine guard or any metal object that would produce noise. In the ensuing unholy racket the object of the "serenade" would slink sheepishly to his work station. This seldom failed to produce results.

Of course, there are times when even the most conscientious man has occasion to be late for work, due to bad weather, sickness in the home, or other causes which provide a legitimate excuse. But in the case under discussion we have an individual who knows the shop rules and is too lazy or careless to make a serious effort to be on time. Maybe he feels his superior ability entitles him to more favorable conditions than his less-skilled brother. If that is a correct appraisal of his mental outlook, the sooner he is weeded out the better. I am not a great believer in slogans or mottoes displayed in the shop or office as a rule, but there are a few exceptions. One of these exceptions is trite but true: "There is no such thing as an indispensable man."

Robert S. Alexander
Greenville, R.I.

•

BLOWING OFF STEAM

Yes, a foreman should keep his own counsel on everything that is unfavorable to any one of his men. However, if he has anything good to say about a man, he is welcome to make a short remark to that effect to anybody if his conversations with his men have any bearing on the issue. For instance, if Billings has done a good job and Reynolds is following up this same job, Ed might say to Reynolds: "Bill is a very good worker. I can see that on this job . . ." or something similar. But if Billings has done a poor job, Ed should tell that to Billings himself in the easiest way possible. Perhaps it is Ed's fault that Billings has done a poor job. He has perhaps not given him correct instructions.

Ed ought not to confide anything unfavorable about any of his men to anybody. If he must blow off steam, he ought to do that to the one causing the pressure to rise. However, if Ed cannot regulate or control the pressure in a way most favorable to his company, he is lacking in one of the vital points that constitute a good foreman.

A. E. Fristedt
Stockholm, Sweden

Parker-Kalon GROUND THREAD Socket Set Screws are *aces high* with shop men

"You can count on uniform, dependable Class 3 fit with P-K Socket Set Screws."
"True ground finish — none of the imperfections you get with ordinary cut thread set screws."
"Clean starting threads speed assembly work and improve production."
"You don't need to be a skilled mechanic to detect the difference — you can feel it."

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See why P-K Ground Thread Socket Set Screws speed assemblies, improve strength and safety. Thread grinding, once reserved for screws used in the finest precision equipment, now gives Parker-Kalon Socket Set Screws the accurate finish and faultless contour that mean faster assembly and more sales for your products. Write for samples today.

SEND FOR STOCK LIST NOW

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200 Varick Street
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AVAILABLE THROUGH ACCREDITED DISTRIBUTORS IN EVERY INDUSTRIAL AREA

These AO Horsehide Gloves and Mittens Outwear Asbestos on Heat Jobs!

When you want the *combination* of protection against extreme heat and wear for your glove and mitten money, the AO 5X166 Heat Glove and 6X151 One-Finger Mitten are your best buys! What's more, they are more *flexible* — permitting workers to do a better job. Highly recommended for die casting, drop forging, annealing furnaces, block bending in shipyard work, steel mill coil tying and similar operations.

QUICK FACTS

- Chrome tanned horsesplit leather, specially tanned to resist heat.
- Both glove and mitten have heavy wool liner and full 4" chrome leather cuff also lined. (Also available with 2" cuff.)
- Clute pattern. Reinforced with leather strap around crotch of thumb.

Your nearest AO Safety Products Representative can supply you.

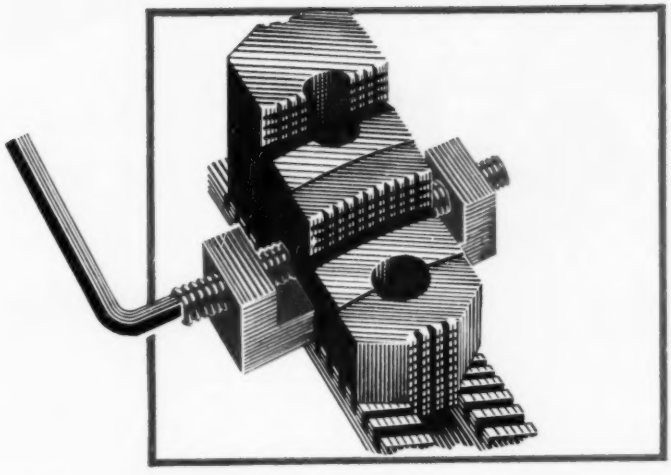
American Optical
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

Predetermined Jaw Pressure . . .

work centering to *precision standards*

CUSHMAN *Power* CHUCKS

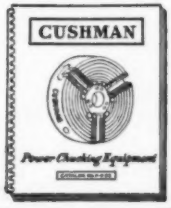


"Accralock," Cushman's exclusive individual jaw adjustment feature for power chucks, provides an extra margin of safety in work holding against heavy cuts, coarse feeds and in high speed carbide tool operations. Adjustment to within .001" concentricity is simple and positive, saving time and effort on every set-up.

Power chucking with Cushman equipment lightens the burden of today's fixed high costs . . . gives you a competitive advantage in greater precision, reduced operator fatigue and increased machine output. Cushman engineers will gladly discuss your particular problems . . . to demonstrate how even the smaller shop can benefit by the use of modern power chucking methods.

THE CUSHMAN CHUCK COMPANY
Hartford 2, Connecticut

Write for CATALOG PO63



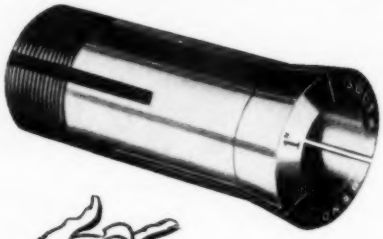
CUSHMAN also manufactures a complete series of WRENCH OPERATED CHUCKS
Write for Catalog 63 and Bulletins

Consult **CUSHMAN**

Chucking Engineers Since 1862

4C949

Hoot Mon! Cut Toolroom Collet Costs -Use SOUTH BEND



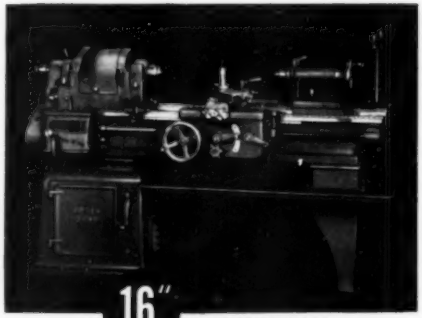
One Size Collet Fits All South Bend Lathes

10" SWING AND LARGER

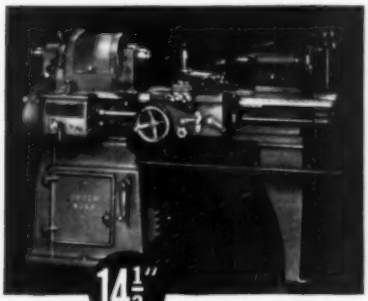
Here's economy that anyone can appreciate. You don't need a separate set of collets for each size lathe when they are South Bends. Collets are interchangeable on all of them, 10" and larger swing. This reduces your collet inventory to a minimum. These collets have 1" maximum capacity and are made of alloy steel or brass. The brass collets cost less and are practical for odd sizes used only occasionally.

Interchangeability of collets is only one way you save money with South Bend Lathes. They make your equipment dollars go farther. The cost of special tooling can often be saved by making use of the many attachments that are available from stock. You'll also notice the difference on your power bills. They're not over-powered, and a greater percentage of their power is transmitted to the work. And you'll find they are readily adaptable to a wide variety of jobs.

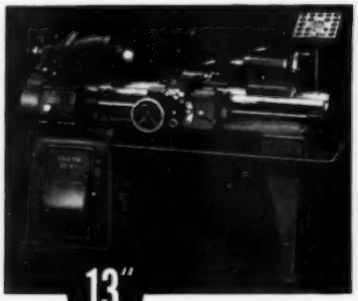
It will pay you to learn more about these money-saving lathes . . . also South Bend Drill Presses and Shapers. Write for information *now*.



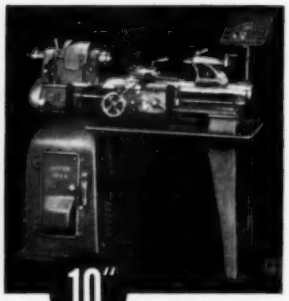
16" TOOLROOM LATHE



14½" TOOLROOM LATHE



13" TOOLROOM LATHE



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SOUTH BEND LATHE WORKS

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it's easier with Abbott
the all round ball

Spring type paper clips, household scissors, clothesline tighteners . . . three more of the hundreds of products that depend on Abbott Bearing Balls for their operating efficiency. Abbott's well rounded line is designed to meet the size, tolerance and sphericity requirements of almost any product being made today. Perhaps you'll find your answer in the chart below.

A-B CHART

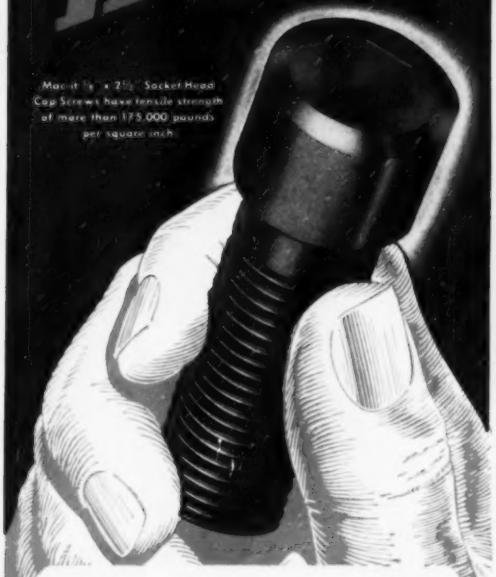
GRADE	SIZES	Size Tolerances	Sphericity Within
Abbott A	1/16" — 5/8"	± .0001"	.0001"
Abbott B	1/16" — 5/8"	± .0002	.0002
Abbott C	1/16" — 5/8"	± .0005	.0005
Abbott Hardware	1/16" — 5/8"	± .001	.001
Abbott Industrial	1/8" — 5/8"	± .002	.002
Abbott Special	1/8" — 5/16"	± .003	.003
	11/32" — 5/8"	± .005	.005

ABBOTT

THE ABBOTT BALL COMPANY
HARTFORD 10, CONN.

P.S. *The round hole in the square peg can help you with your burnishing problems, too. Ask for a sample kit.*

IT'S A
Mac-it®
PRONOUNCED "MACK-IT"



BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first.*

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Hollow Lock Screws
Hollow Set Screws
Stripper Bolts
Hollow Pipe Plugs
Socket Screw Keys
Square Head Set Screws
Hexagon Head Cap Screws
. . . and many others

Marketed Nationally Since 1913 by
STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio
Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

It PAYS to use APEX sockets & wrenches

Here's WHY it pays to use Apex Sockets and Wrenches:

FIRST. They are accurately machined from electric furnace high carbon alloy bars — cold broached and carefully heat treated. They are built to stand tremendous strains and shocks.

SECOND. The Apex line includes standard sockets, thin wall, extra long and extra long thin wall. Also extensions, straight nut setters, universal adapters, universal wrenches — and many others.

THIRD. Apex Universal or tension wrenches are the answer for those hard-to-get-at places. They will not bind or lock and they meet all safety requirements.

Thousands of standard items are listed in Catalog No. 19. But if you need specials, merely send us sketch, print or description and we'll quote promptly.

CATALOGS will be sent only upon requests written on company letterheads.

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Safety Friction Tapping Chucks • Quick Change and Positive Drive Drill Chucks • Vertical Float Tapping Chucks • Parallel Floating Tool Holders • Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches

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has exactly what you are looking for

in MOTORIZED

PRECISION SPINDLES

Here is a representative showing.

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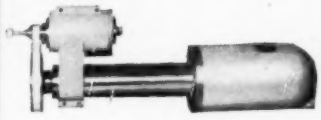
POPE Heavy Duty Motorized Spindle for surface grinders, planers, boring mills and other machine tools.
In standard sizes from ¾ HP to 20 HP and from 900 to 3600 RPM.
Available with flange, tapered or special nose for quick mounting of wheels or tools. Ask for Catalog No. 58.

POPE *Sealed-In Lubrication*

P-32T

POPE Direct Motorized Cartridge Type Spindle for 6" x 18" Surface Grinders and other uses with 1 HP, 3600 RPM totally enclosed motor—a sealed package.

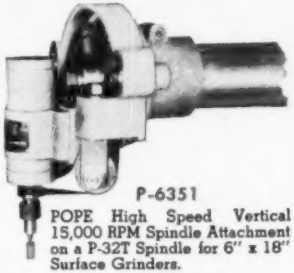
POPE *Sealed-In Lubrication*



P-6271

POPE High Speed Horizontal 15,000 RPM Spindle Attachment on a P-32T Spindle for 6" x 18" Surface Grinders.

POPE *Sealed-In Lubrication*



P-6351

POPE High Speed Vertical 15,000 RPM Spindle Attachment on a P-32T Spindle for 6" x 18" Surface Grinders.

POPE *Sealed-In Lubrication*

P-5552

POPE Heavy Duty, *High Frequency*, Direct Motorized, Cartridge Type Milling Spindle. 15 HP, 14,400 RPM totally enclosed, water cooled motor, 240 cycles, 3 phase.

Oil Mist Lubrication

P-5681

POPE *High Frequency* Direct Motorized, Cartridge Type Spindle, with 1 HP motor at 7200, 10,800, 14,400 and 21,600 RPM, using 240 and 360 cycle current in combination with a two-pole, four-pole motor.

POPE *Sealed-In Lubrication*

These Spindles provide you with:

Continuous, Maximum Production . . . Uniformly High Quality Surface Finish . . . Cool Operation at High Speeds . . . *Sealed Lubrication*—no oiling or greasing, nothing to renew, replace or adjust throughout the entire life of the bearings.

No. 64

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ESTABLISHED 1920

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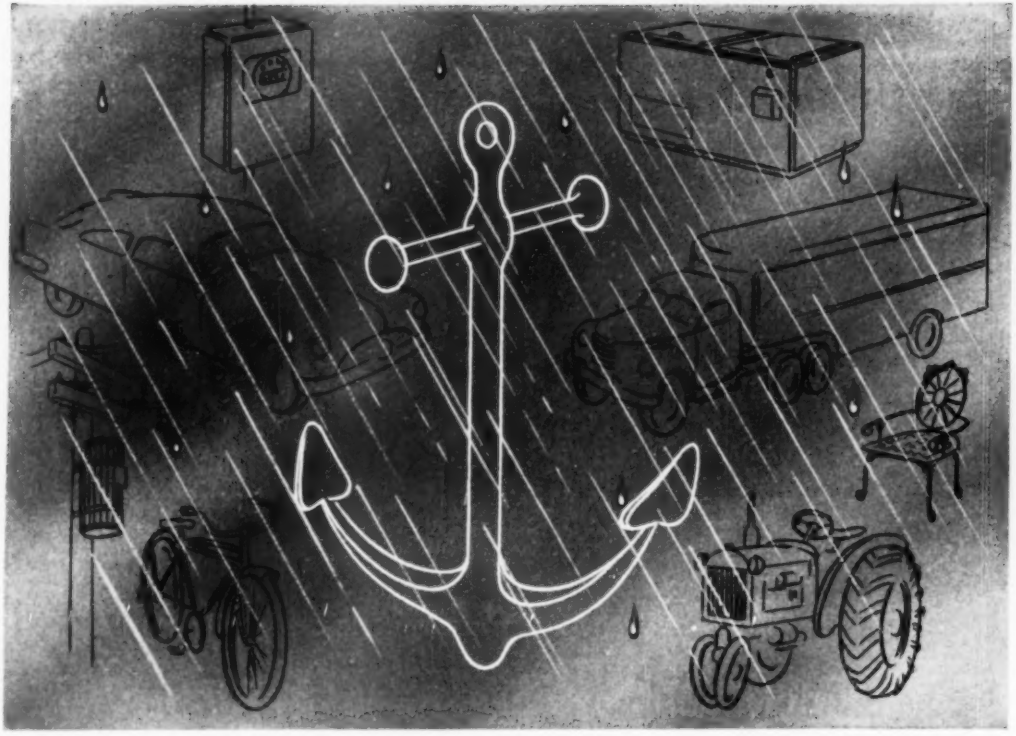

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HOLDS PAINT TO METAL

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1. It anchors the paint.
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New Catalogs, Booklets, Bulletins

MACHINES AND ATTACHMENTS

1 JIG GRINDERS — *Hauser Machine Tool Corp., Manhasset, N. Y.* 4-page pamphlet gives complete description including detailed illustrations of the Hauser 3S Swiss jig grinder. Also available is a 4-page catalog describing the company's high-precision circular tables and universal tilting circular tables for precision jig borers. A third catalog includes jig-boring machines, optical checking and measuring apparatus and special automatic machines for watch-making and similar industries.

2 POLISHING, BUFFING MACHINES — *Hammond Machinery Builders, Inc., 1609 Douglas Ave., Kalamazoo, Mich.* 6-page bulletin No. 10 illustrates ten of the company's Junior Automatics for polishing, buffing, and brushing. Detailed descriptions and engineering specifications are given.

3 SPEED CONTROL—*Reeves Pulley, Columbus, Indiana.* 38-page catalog M-499 describes the vertical and horizontal vari-speed motordrive. Design and operating features, lubrication diagram, operating principle, maintenance information and 24 pages of rating tables, frame sizes, weights and dimensions are included.

4 TURNING MACHINE—*The Monarch Machine Tool Co., Sidney, Ohio.* 15-page booklet affords general description of Monarch-Keller form turning machine. With photographs the booklet illustrates the numerous jobs handled on this machine.

5 GRINDERS—*Gallmeyer & Livingston Co., Grand Rapids 7, Mich.* 12-page bulletin GL-12-48 gives complete description, illustrations, and specifications for the Grand Rapids No. 10 universal cutter and tool grinder. The unit has a 5x30-in. table and 10-in. swing diameter. Included are brief descriptions of two other universal cutters and tool grinders and a hydraulic feed surface grinder.

6 PRESS BRAKES—*Dreis & Krump Mfg. Co., 74th and Laramie Blvd., Chicago 38, Ill.* 16-page bulletin 48 PB covers the complete line of Chicago Steel press brakes. Descriptions of units for bending, beading, forming, crimping, curling, drawing, embossing, forming, joggling, notching, punching, shearing, slitting, and trimming are presented.

7 PRESSES—*The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.* 19-page booklet entitled "Case Histories in the Reduction of Metal-Working Costs" gives 17 cases where HPM presses have resulted in reduction of metal-working costs.

8 MILLHEAD — *Rusnch Tool Works, 4040 W. North Ave., Chicago 39, Ill.* With pictures and captions this 16-page bulletin describes various applications of the Rusnch millhead. Illustrations and descriptions of the company's precision parts and accessories are given as well as dimensional diagrams and specifications of the millhead.

9 PRESSES—*Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Cicero 50, Ill.* 16-page catalog 749-5M offers complete information and specifications on the line of Danly heavy-duty auto-feed presses. Detailed information is given on exclusive mechanical features including the new Danly clutch. Units are available from 50 to 800 tons.

10 DRILLS—*The Fredrick Machine Tool Co., Cincinnati, Ohio.* 17-page catalog No. 40 presents a detailed description liberally interspersed with illustrations and machine drawings of the Fredrick sensitive radial drill. Equipped with an automatic tool ejector this machine comes in spindle speeds ranging from 60 to 1500 rpm.

11 KNIFE GRINDERS—*Samuel C. Rogers & Co., 183-205 Dutton Ave., Buffalo 11, N. Y.* 8-page catalog No. 132 249 illustrates and lists prices of the company's line of knife grinders, saw sharpeners and filers, saw brazers, and accessories.

12 METAL STITCHERS—*Acme Steel Co., 2849 Archer Ave., Chicago 8, Ill.* 8-page pamphlet illustrates and demonstrates uses of the company's line of metal stitchers. In an operation similar to stapling these units can stitch metal-to-metal or metal to a variety of other materials.

TOOLS AND ACCESSORIES

13 VIBRATION CONTROL—*The Korfund Co. Inc., 48-15 32nd Place, Long Island City 1, N. Y.* 4-page catalog LX 551 gives engineering data, machine drawings, illustrations, and description of the company's Type-LK Vibro-Isolator.

14 LUBRICANT—*The Alpha Corporation, Greenwich, Conn.* 4-page bulletin 52 covers principles, applications, and test results for Molykote high-pressure lubricant. This molybdenum-disulfide compound powder has been successfully tested at pressures up to 500,000 psi.

15 AIR GAGE—*Federal Products Corp., 1144 Eddy St., Providence 1, R. I.* 12-page folder is devoted to a liberally illustrated description of the Federal-Dimensional air gage. Variety of applications of the unit is also demonstrated.

16 ABRASIVES—*Simonds Abrasive Co., Philadelphia 37, Pa.* 4-page bulletin No. ESA-188 explains how abrasive segments are used, lists their advantages, and discusses abrasives and bonds employed. Grain and grade recommendations of abrasive segments for both surface grinding and machine knife grinding operations are included.

17 DRILLS & REAMERS—*Charles H. Besly & Co., 118 North Clinton St., Chicago 6, Ill.* 48-page catalog presents complete specifications and prices on this company's line of high-speed twist drills and reamers. This includes all standard sizes and types of taper and straight shank regular three-fluted and four-fluted drills.

18 TIMING DEVICE—*Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn.* 4-page brochure explains the Syncro Timer remote-control timing device put out by this company. This unit will direct, classify, or sort almost anything produced continuously.

19 PRESSURE GAGE—*W. C. Dillon & Co. Inc., 5410 West Harrison St., Chicago 44, Ill.* Liberally illustrated 4-page pamphlet demonstrates the uses of the Dillon mechanical pressure gage. Units are available in capacities ranging from 100 to 5000 lb.

HEAT-TREATING AND WELDING

20 GENERAL EQUIPMENT — *Smith Welding Equipment Corp., 1633 Fourth St., S.E., Minneapolis 14, Minn.* Catalog 149 gives a complete listing including prices of this company's welding equipment. Almost all of the equipment listed is illustrated.

21 RESISTANCE WELDING—*The Resistance Welding Institute, Horsman Bldg., Detroit Ave., at Warren Road, Cleveland 7, Ohio* 32-page bulletin explains and illustrates advance techniques in resistance welding. Theory and application of spot welding, seam welding, projection welding, and butt welding are also covered.

22 ELECTRODES — *The Champion Rivet Co., Cleveland, Ohio.* 32-page catalog No. 49A lists and describes the company's line of electrodes giving dimensions, current rating, and voltage in each case. Physical properties (as welded) applications, chemical analysis of weld deposit, and procedure are also included in this booklet.

Example

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Title Supt. .....

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Co. Address 601 North St. ....

Brooklyn, N.Y. 32

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23 ARC WELDING—*The Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.* 4-page booklet entitled "Argon Metal Arc Welding of Aluminum" discusses work range, process advantages, welding speeds, welding equipment requirements, power and accessory equipment, and welding procedure for the Argon metal arc-welding process.

24 WELDING RODS AND ELECTRODES—*American Brake Shoe Co., 230 Park Ave., New York 17, N. Y.* 4-page selector and comparison chart lists in table form the welding rods and electrodes recommended for different types of welding jobs. Competitive welding rods for each service are also listed.

25 ARC WELDING — *Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.* 16-page catalog 9 describes Heliwelding, an inert gas shield arc-welding process. Illustrated with photographs, sketches, and tables, this booklet tells when and how to use the Heliwelding process.

26 HARD FACING — *Wall Colmonoy Corp., 19345 John R Street, Detroit 3, Mich.* 4-page illustrated pamphlet covers the company's Spray weld hard-facing method. This method is said to attain the hardnesses up to 56 to 61 Rockwell C. Applications and limitations of the process are listed.

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27 DRYERS—*C. M. Kemp Mfg. Co., 405-15 East Oliver St., Baltimore 2, Md.* 32-page catalog D-27 gives a comprehensive discussion of desiccant-bed drying of air, gases and liquids. The basic principles and specific factors affecting the dynamic drying of air, compressed air, gaseous ammonia, nitrogen, metallurgical atmospheres (heat treating) hydrogen, inert gases, oxygen and various liquids are included.

28 FIRE PROTECTION — *The Protectoseal Co., 1919 South Western Ave., Chicago 8, Ill.* 12-page self-checking chart outlines procedure to be followed in helping industry reduce the hazard of fire. The pocket in the back of the book contains seven departmental charts for making easy and accurate check-up on inflammable hazards.

29 FORK TRUCKS—*Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.* 24-page booklet includes ten cases where Clark Fork Lifts solved unique industrial problems. Each case is illustrated.

30 RELAYS — *Ward Leonard Electric Co., 31 South St., Mt. Vernon, N. Y.* 12-page relay catalog No. D-26A illustrates and describes seven standard types of magnetic relays for industrial control applications. Technical data on ratings, dimensions, coil specifications, and applications is included.

31 POWER DISTRIBUTION—*General Electric, Schenectady 5, N. Y.* 20-page illustrated bulletin GEA-5231 describes the company's newest Telemetering equipment for electric power distribution and industrial applications. Included are descriptions, dimensions, and specifications of telemeters and auxiliary equipment.

32 CHAIN HOISTS—*The Harrington Co., Philadelphia 10, Pa.* 4-page bulletin P-5 provides an illustrated description of the company's one-ton hand chain hoist. Also included are brief descriptions and pictures of four other hoists ranging in capacities from ½ to 80 tons.

33 SLING CHAINS—*The McKay Co., Pittsburgh 22, Pa.* Wall Chart No. C-1 offers complete data on alloy and iron chains and the working load limits of sling chains in 9/32 to 1 in. sizes, as well as weights of loads that can be lifted when a given sling is used at angles of lift from 10 to 90 deg.

34 MAGNETIC SEPARATORS—*Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 14, Wis.* 8-page illustrated catalog C-5000A describes company's electric and non-electric magnetic pulleys, non-electric magnetic drums, triple pole rectangular magnets, lifting magnets, non-electric plate magnets, high intensity inclined roll, and crown belt magnetic separators.

PARTS AND MATERIALS

35 SPEED REDUCERS—*D. O. James Gear Mfg. Co., 1126 W. Monroe St., Chicago 7, Ill.* 24-page illustrated catalog No. 40-S contains engineering data and prices on single and double worm-gear reducers. Single reduction units come in ratios ranging from 5.66:1 to 100:1. Double worm-gear reducers are available in ratios ranging from 87:1 to 10,000:1.

36 AIR CYLINDERS—*The Bellows Co., Akron, Ohio.* 12-page bulletin PD-120 presents data including dimensional drawings on the different types of mounts and different sizes of this company's Power Dome non-rotating double-acting air cylinders.

37 BALL BEARINGS — *Marlin-Rockwell Corp., Jamestown, N. Y.* 40-page bulletin No. 26 contains a list of bearing numbers of over 12,500 different ball bearings made by American Ball Bearing Manufacturers. Bearing numbers for each manufacturer are arranged numerically.

38 HOSE COUPLING — *Hose Accessories Co., Lehigh Ave., at 17th St., Philadelphia 32, Pa.* Pamphlet No. 5 describes and illustrates the company's line of Lehigh suction and water hose couplings. A new series of fire hydrant reducer which couples 4½ and 1-in. hose fire plugs is shown in this pamphlet.

39 PLASTIC COATING—*Better Finishes and Coatings, Inc., 160 Duryea Ave., Hasbrouck Hts., N. J.* 24-page booklet entitled "How Chemist Uses Liquid Envelope" is a picture record of the manufabricating and assembly operations in the Canadair plant where pastable, protective plastic coating is used.

40 SPEED REDUCER—*The Cleveland Worm and Gear Co., 3249-59 E. 80th St., Cleveland 4, Ohio.* 8-page booklet illustrates six applications of the company's specialized worm-gear speed reducers. Nine different models of the speed reducer are illustrated on the back of the booklet.

41 GEARS—*Rockford Manufacturing Co., Lafayette, Ind.* Illustrated 12-page booklet shows how gears are manufactured including the research which goes into their production. Size ranges of all of the different types of gears produced by this company are included.

42 ABRASIVE RESISTANT ALLOYS — —*American Brake Shoe Co., 230 Park Ave., New York 17, N. Y.* 6-page folder describes the physical properties of Thermalloy HC-250, the company's abrasive resistant alloy. Case histories of the metal giving actual field service data are included.

43 ZINC COATED STEEL — *Armco Steel Corp., Middletown, Ohio.* 12-page booklet entitled "Fabricating and Finishing of Armco Zinegrip-Penngrip" describes recommended methods for forming, joining, and painting this special zinc-coated and hunderized sheet steel. Suggestions for storage, forming and drawing, welding, and soldering, and cleaning and painting are included.

44 ELECTRIC MOTORS — *Franklin Electric Co. Inc., Bluffton, Ind.* 8-page catalog illustrates the line of fractional-horsepower electric motors with NEMA rigid and resilient and special mountings. Applications, motor designs and mountings, and cutaway illustrations are shown.

45 HYDRAULIC EQUIPMENT — *Le Pleasant-Chester Mfg. Co. Inc., Cedar Rapids, Ia.* 16-page catalog provides illustrations, descriptions, applications, dimension drawings, and performance charts on the company's line of hydraulic products. Pumps, motors, valves, power control units, and cylinders are included.

46 STEEL—*LaSalle Steel Co., Chicago 80, Ill.* 32-page manila-bound booklet called "Data on Stressproof" features a discussion of the properties of this company's stressproof steel. Included are illustrations and engineering data on a wide variety of pieces of equipment made of this material.

MISCELLANEOUS

47 METAL FINISHING—*AZRO Inc., 80 E. Jackson Blvd., Chicago 4, Ill.* Two manila-bound manuals, one a 32-page sales manual, and the other a 17-page analytical manual cover this company's products for protecting and decorating zinc or steel surfaces. The form, type, properties, characteristics, formula, equipment required, operating conditions, and maintenance and control of the company's wide range of coatings and surfaces are given in the sales manual. Procedures for chemical analysis for the various materials are presented in the analytical manual.

48 GENERAL MACHINERY—*Bucyrus Nerton Mfg. Co., Geneva, Ill.* 20-page booklet entitled "Working Together" includes a brief history and a pictorial tour of this company's 185,000 sq ft contract manufacturing plant in Geneva.

49 FORGINGS AND STAMPINGS—*Bingham-Herbrand Corp., Bingham Division, Toledo, Ohio, Herbrand Division Fremont, Ohio.* 24-page booklet complete with illustrations covers the company's stamping and drawing, welding, assembly, finishing, forging, trimming, punching, coining, heat-treating and die-making operations.

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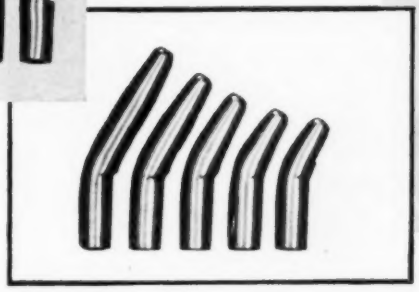

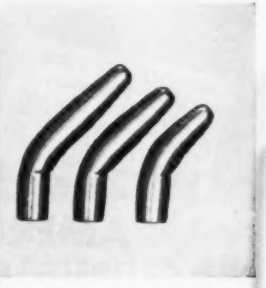

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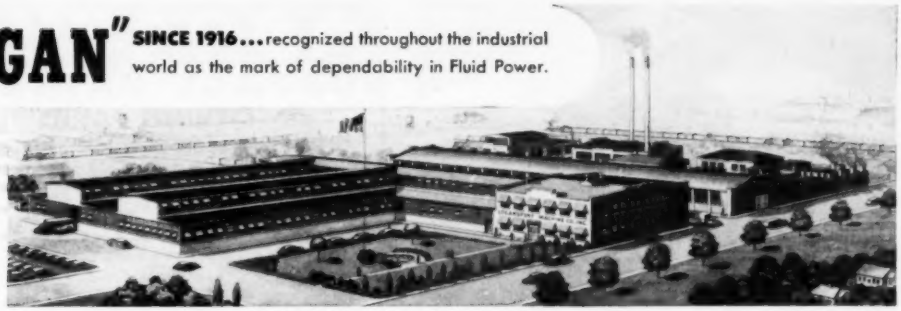

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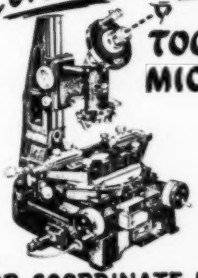

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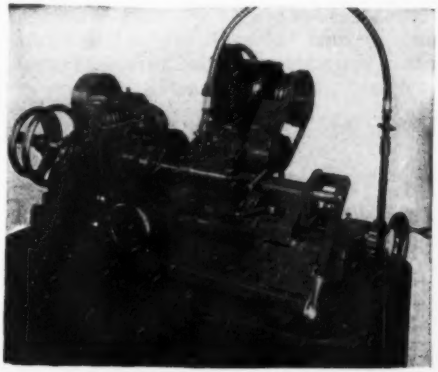

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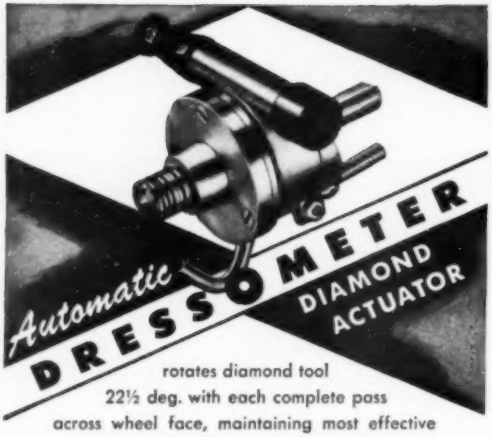

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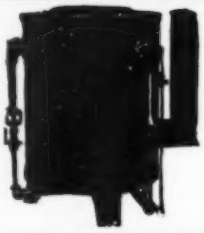

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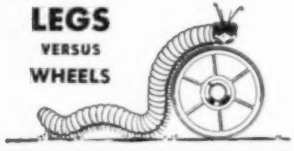

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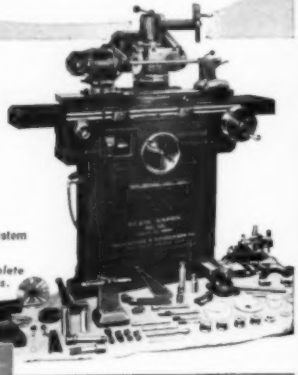

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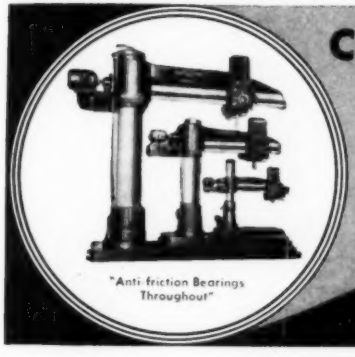

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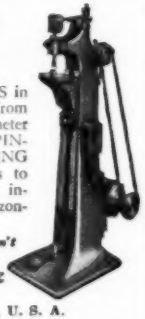

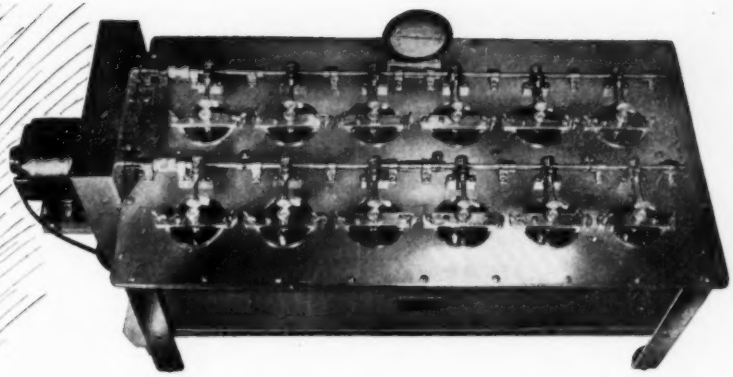

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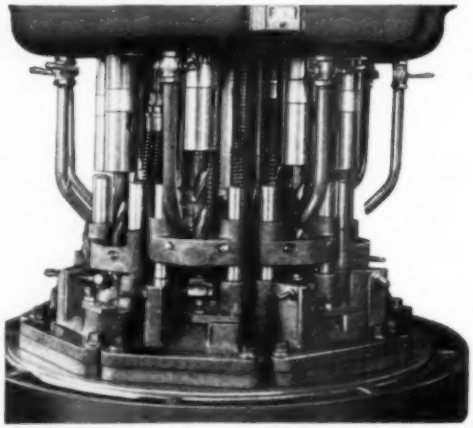

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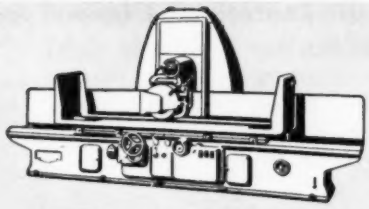
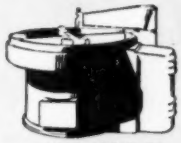
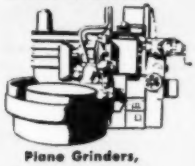


Precision Surface Grinders
Horizontal Spindle

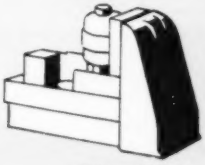
Disc Grinders,
Double Spindle Type



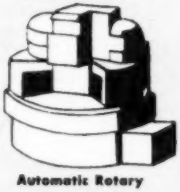
Vertical Spindle
Disc Grinders



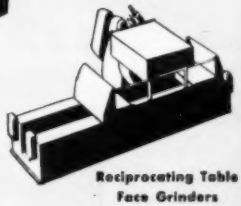
Plane Grinders,
Rotary Table Type



Rotary Table
Surface Grinders

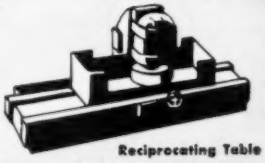


Automatic Rotary
Surface Grinders



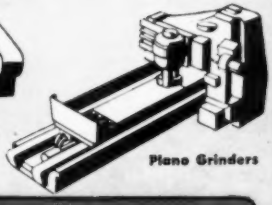
Reciprocating Table
Face Grinders

Disc Grinders,
Single Spindle Type

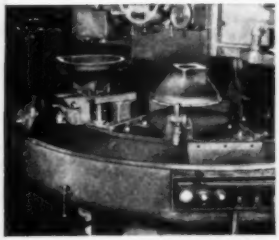


Reciprocating Table
Surface Grinders
Vertical Spindle

Face Grinders,
Traveling Wheel



Plane Grinders



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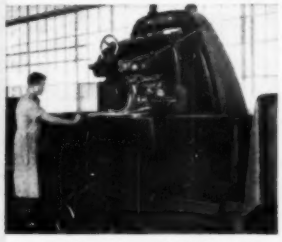

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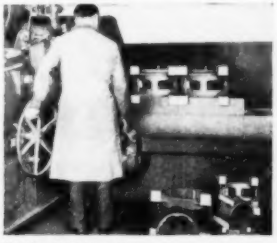

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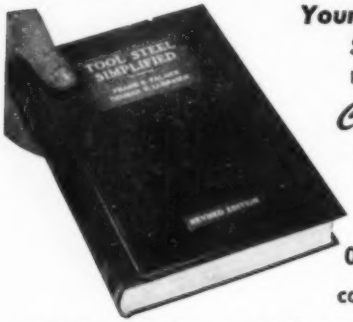

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11. Hardness and Toughness Testing
12. Properties and Heat Treatment of Twelve Matched Tool Steels
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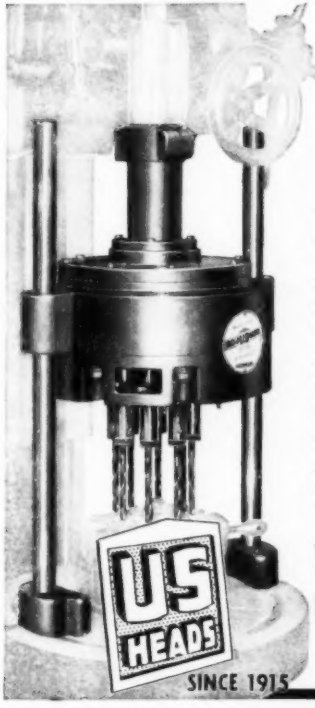

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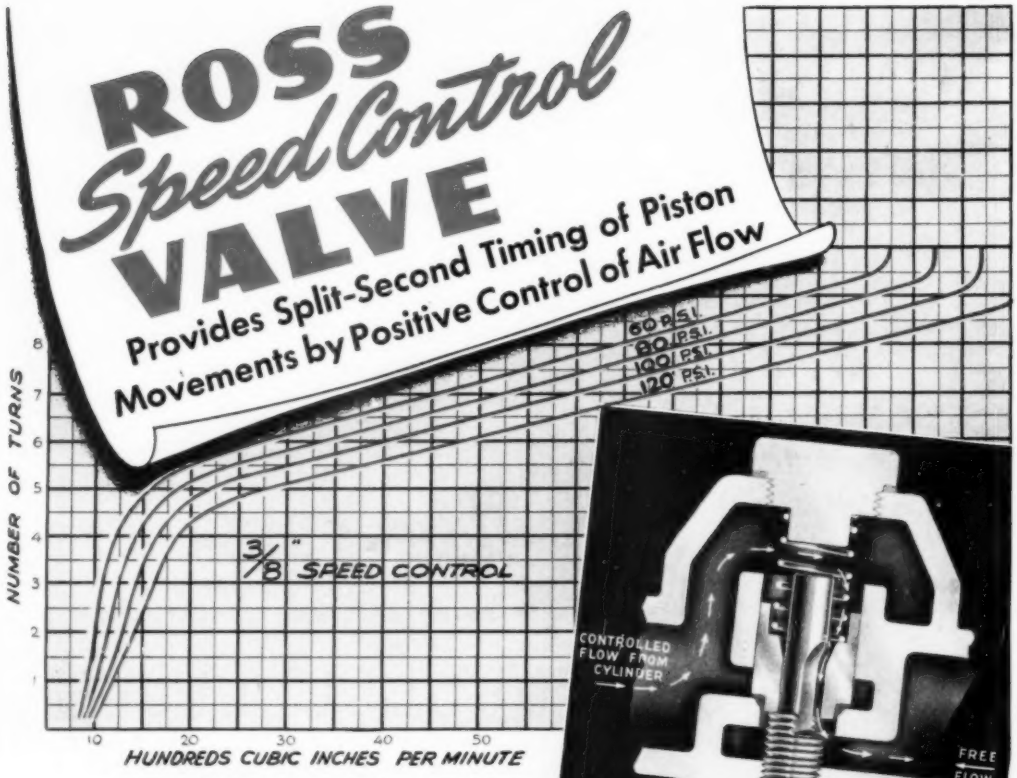
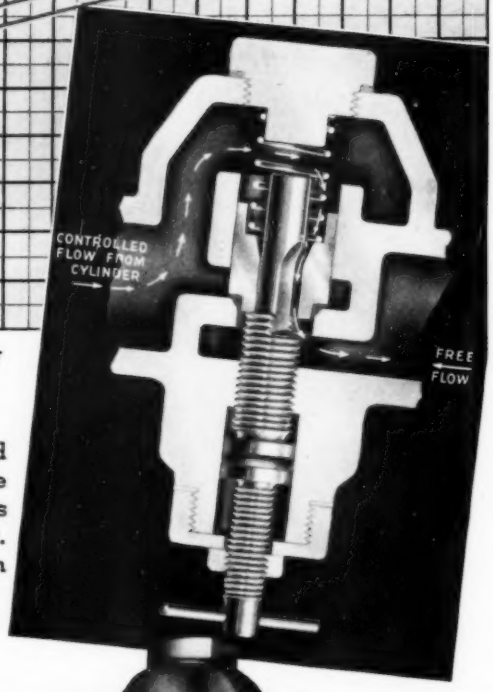


Available in sizes ¼" through 1¼"



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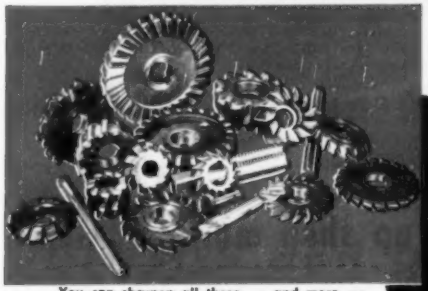

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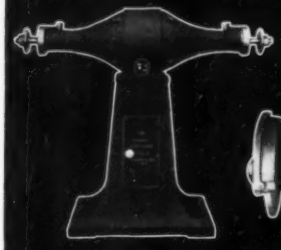
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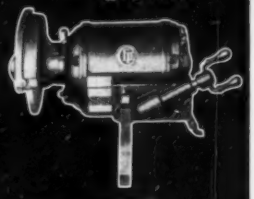
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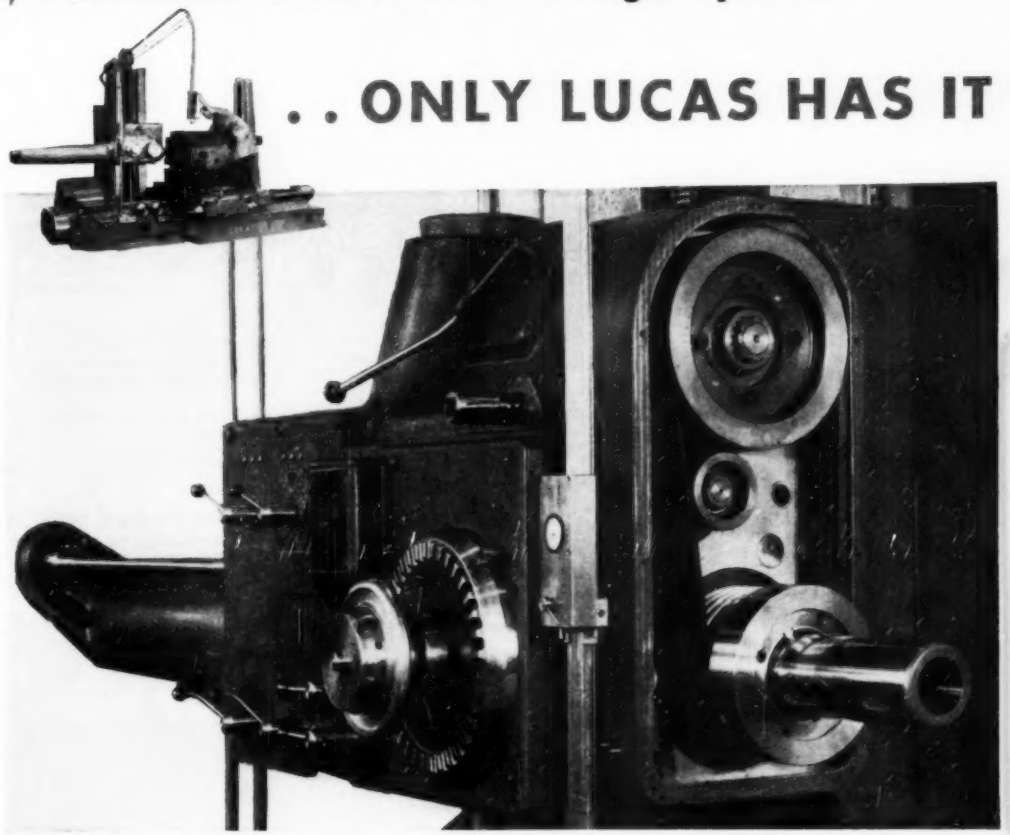

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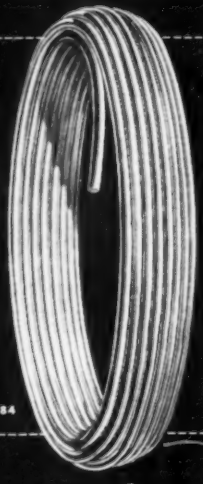

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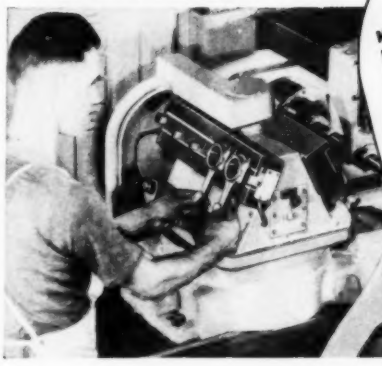

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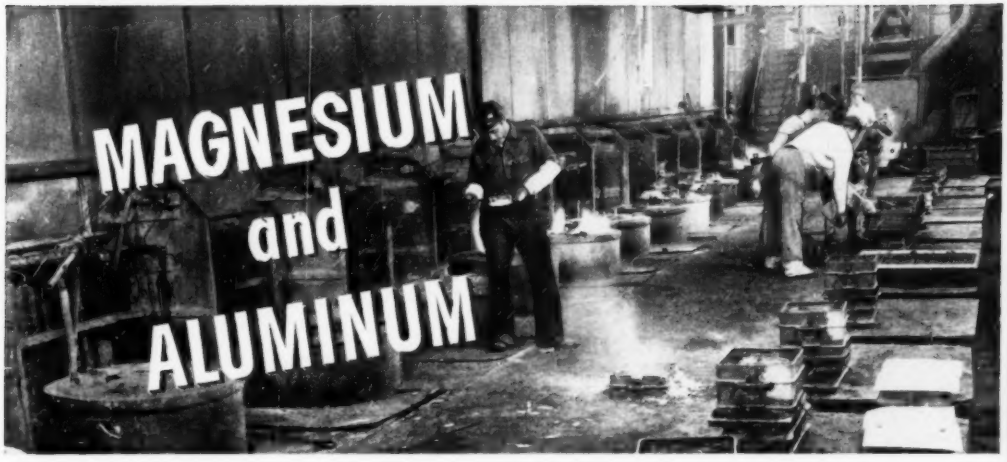

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SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 39 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

SHOP SUPT. 22 yrs. diversified machine shop experience in job shops manufacturing and erecting of heavy precision machinery. Familiar with modern machine shop methods, ranging from blue print stage through processing design, tooling, estimating, plant layout, cost control, time study and labor relations. Age 40. Desires Chicago or Eastern location. PW-1214, American Machinist.

COST REDUCTION Engineer with years of experience on manufacturing methods, tooling, plant layout, design improvements and production engineering. Past five years on cost reduction work. Desires connection with reliable concern. PW-1292, American Machinist.

SELLING OPPORTUNITIES WANTED

CONSULTING SALES Engineer: 10 years successful experience in light and heavy machinery now available. Age 35: Resume furnished. SA-1354, American Machinist.

MANUFACTURERS AGENTS operated by energetic successful engineers with extensive experience in producting and selling important mechanical products. Seeks additional account for eastern seaboard. Facilities include large scale export and government sales. Special assignment acceptable. RA-1365, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office, Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel. Registered Patent Attorneys, Suite 453, 815-15th Street, N. W., Washington 5, D. C.

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We offer experienced engineering cooperation for low cost or mass production of any precision products — SMALL or LARGE orders receive same close attention. Completely equipped modern shop with low overhead; turret and engine lathes; Millers; oil groovers; welding; skilled labor; near railroad. Consultation without obligation.

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Do You require representation in Chicago territory? Our client can show a long record of successful selling and contacts in the larger shops. This is exclusive of the war years. Experienced in production equipment. Straight commission. Interview may be arranged by writing to

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Well known in engineering and purchasing circles with ten years selling experience in Cleveland area handling metal working production equipment offers services as manufacturer's agent to sell allied but non-competitive lines.

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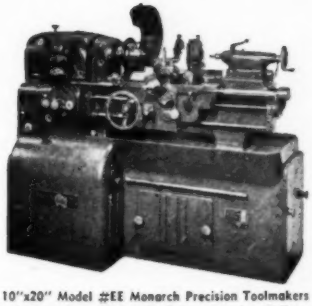


10"x20" Model #EE Monarch Precision Toolmakers Lathe. Late Type. W/Taper Attach. Collets, chucks, toolholders, tool cabinet.

ENGINE LATHES

LeBlond 36"x30' Q.C.G. Hvy. Duty Geared Head Screw Cutting Engine Lathe. Serial #NK-230. 12 Speed Head. 36" internal grd. faceplate, Taper Attachment, Dial Thrdg. Set of toolholders. Max Swing—39". Centers—22'6". 25 h.p. 3/60/220/440 volts V-belt drive.

24"x16' American Q.C.G. Motorized Cone Head. 11' centers. Taper Attachment 24" chuck, faceplates, cabinet type legs. 220/440 volts motor.

18"x6' Monarch 8-Speed hd. Q.C.G. 220 volts motor. Actual swing—20¼", 20" c.c. Hex. Turret on crosslide. Cabinet legs.

16"x6' Monarch 8-Speed Hd. Q.C.G. 220 volts motor. 24" c.c. Univ. Chuck, Draw-bar & set of 16th collets and 32nd collets.

14½"x6' South Bend Enclosed Head, Motor Driven. Taper Attachment, Chucks, Turret Toolpost Threading Dial, Ram Type Turret Attachment, Collets & Collet Chuck.

14"x8' Reed-Prentice Eight Speed Selective Geared Head, Q.C.G. Motor driven w/220/440 volts motor & controls. Has Taper Att. chuck, faceplates, steady rest, cabinet legs, max. centers —48". Completely rebuilt. Immediate shipment.

22"-46" x 10' Q.C.G. Putnam Extension Bed Gap Lathe. Motor, faceplates & chuck.

Bliss-Consolidated #77 Motor Driven Open Back Gap Frame Single Crank Single Action Backgeared Power Press. Has Automatic Roll Feed & Roll Straightener, also Ejector under Bed. 160 Tons Cap. 10" Stroke. Tie Rods & Inclined Base.

TURRET LATHES

Bardons & Oliver #1 Electric Turret Lathe. ¾" cap. Has bar feed & collets.
Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw, Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed 1½".
W-Swasey #3 Univ. 1½" cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.
Warner & Swasey #1A Universal Heavy Duty Saddle Type Turret Lathe. Serial #648220. Capacity —2½" rd., Gr. Hd. 12 speeds. Coolant system, bar feed, chuck & tooling. Immediate delivery.

GRINDING MACHINES

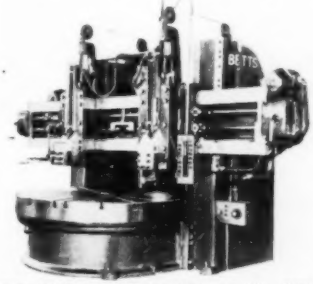
Blanchard #16 Motor Driven Vertical Rotary Surface Grinder. 26" Chuck with power down feed.
Cincinnati 10"x36" Plain Hydraulic Cylindrical Model #EA. Serial #5P2D1L-19. Filmatic Bearings. Built-in Electrics. Hydraulic Infeed.
Heald #22 & #25, 12" & 16" Horizontal Rotary.
Cincinnati 'Monoset' Model #OE Cutter & Tool Grinder, Motor driven. With motors & controls. Set of collets, taper & cylindrical and equip.
Thompson 6x18 Hydraulic Horiz. Surface. Wet & dry work. 220/440 motor driven. Auto, downfeed to head. Motor driven exhauster unit.
#2 Cincinnati Universal Tool & Cutter Grinder. Late Type. Univer. Motor Driven Workhead, Diamond Bracket, etc. 220/440 volts motor.
Norton 6x18 Vertical Rotary Automatic Surface Grinders. 220/440 volts motors. Excello Spindles. Hydraulic Table feeds. Three Available with immediate delivery. Also 6x18 Horizontal.
Mattison 12" x 16" x 48" Motor Driven Precision Hydraulic Horizontal Surface Grinder. Serial #13025. Excellent condition. 220/440 motors. W/12" x 148" Chuck & G.E. Generator. Built-in push button controls. ONE AVAILABLE.
Norton #2 Cutter & Tool. New—1943. W/Equip.
B & Sharpe #13 Univ. & Tool. 220 Volts.

AUTOMATICS

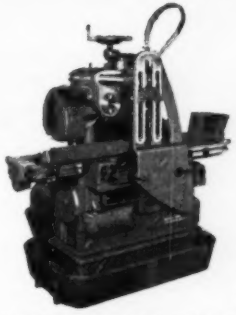
#OG & #00 Brown & Sharpe Automatic.
#2G Brown & Sharpe Standard Speed. 220/440 volts motor & push button.
#2 Brown & Sharpe Automatic Turner drive 220/440 volts motor. With Stock.
Cleveland Model "A" 3¾" capacity Single Spindle Motor Driven Automatic. Has lot of tooling, collets, motors and switches & coolant system. 1943.

PUNCH PRESSES

O.B.I. Johnson (NEW) all sizes, geared & plain.
O.B.I. Toledo #5, 44 tons cap. motor dr.
O.B.I. Bliss #18, 19C, 20, 20B, 21 motorized.
O.B.I. Michigan, 36 tons cap. Wide ram & bed.
#68C Bliss Dble. Action 3-Crank.
#91C Toledo Sgle. Act. Dble. Crank S.S.
#305 Bliss S.S.S.A. 95 Tons Cap.
#3A Bliss S.A.S.S. Dble. Crank.
Zeh & Hahneman 35 Tons S.A. Cam Release Spring Return. 220/440 motor.



Betts 100" Vertical Boring & Turning Mill. 1944 machine. 2 plain heads. Complete Electrical Equipment. Excellent condition. Immediate delivery.



Brown & Sharpe #12 (Electrics built-in) Late Type Milling Machine. 24" Table Travel. Motor driven coolant. Also 18" travel machines. Immediate shipment.

MILLING MACHINES

Milwaukee #2B Dbl. Overarm, Horiz.
#3 Dial Type, H.S. Cincinnati Vertical Mill. Power Rapid Traverse, speeds up to 1300 r.p.m. Range—34"x16"x16" Head has 6" vertical with four stop indicator. Serial #4A3V1L-61. Timken Bearing. 10 h.p. motor drive in base.
#3V Van Norman Ram Type Vert. Late Type.
#2, #3, #4 Cincinnati High Power Vert.
#4-36 Cincinnati 4-Spdle. Duplex Hydromatic.
#4-36 Cincinnati Plain Hydromatic.

UNIVERSAL MILLING MACHINES

B & S #2, 20"x5"x17½".
B & S #1½, 20"x7"x18".
Bridgeport, 20'x9'x16" Turret Type.
Garvin #2MU, 24"x8"x18".
Kempsmith #2, 28"x8½"x18".
Cincinnati #2M, 28"x10"x18".
B & S #3, 34"x10"x21".
Cincinnati #3S 34"x12"x20".
Some w/index heads & equipment.

NEW—GEMCO 20" Universal Shaper. 220/440 motor. Power Rapid Traverse, horiz. & vert. Large Discount. Immediate shipment.

RADIAL DRILLS

Cinci-Bickford 6' Arm, 15" Col. 24 Speeds.
Cinci-Bickford 5' Arm, 13" Col. 24 speeds.
Cinci-Bickford 3' Arm, 9" Col. 12 Speeds.
Cinci-Bickford 6'-19" Super Service. New in '42. 36 Spdle. Speeds. Standard Base, plus angle base. Necessary Motors.

BORING MILLS

2½" bar Cleveland Horiz.
3⅛" bar Giddings & L. Horiz.
5" bar Barrett #2 Cylinder.
8" bar Barrett #6 Cylinder.
Ryerson #11 Horiz. 3" Capacity, #6 M.T.
24" Bullard Vertical, Motorized.
42" Bullard Vertical, Motorized.
54" Bullard Vertical, Motorized.
42" Gisholt Vertical, Motorized.
60" Betts Vertical, Motorized.

EASTERN OFFERS LATE TYPE MACHINES — ATTRACTIVE PRICES

SURFACE GRINDERS

Hanchett Horizontal Plano-Type, model OS, 28x120", very late type
No. 7B Van Norman Automatic Piston Turning and Grinding Machine, m.d.
Arter Model A-1-8" Rotary, m.d.
No. 11 Blanchard Rotary, m.d., latest
No. 16 Blanchard Rotary, m.d., 26" chuck
No. 22—12" Heald Rotary, m.d., latest
No. 22—12" Heald Rotary, m.d.
No. 25A—16" Heald Rotary, m.d., latest
No. 25A—24" Heald Rotary, m.d., latest
No. 33 Abrasive Vertical, m.d.
No. 200—16" Heald Rotary, belt
10x12x60" Norton Hydraulic Surface, m.d., latest
14" Pratt & Whitney Vertical, m.d.
22" Pratt & Whitney, Vertical, m.d.
54" Bridgeport Knife, belt

THREAD GRINDERS

No. 33 Excello Precision, m.d., latest
No. 39A Excello Internal Thread, m.d., latest

TOOL & CUTTER GRINDERS

No. 2 Cincinnati Universal, m.d., latest
No. 2 Norton Universal Hydraulic, m.d., latest
No. 13 Brown & Sharpe, m.d., latest
Cincinnati Monoset, m.d.
Sterling Tool & Cutter, m.d.
Gleason Cutter, m.d.
No. 2B Sellers Drill, m.d.
No. 12M Grand Rapids Tap, m.d.
No. 4T Sellers Tool, m.d., latest
No. 5I Oliver Drill Pointer, m.d.

MANUFACTURING LATHES

No. 3A Lodge & Shipley Duomatic, 30 H.P. motor, late type
No. 4 LeBlond Boring Lathe, 37" bed, 13" hole
No. 9, 12 LeBlond Multi-Cut, m.d.
3½"x36", 3½"x80", 4x60", 8x84" LeBwing, m.d.
9x132" LeBwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
13"x24" LeBlond Rapid Production, Timken, latest
13"x24" Coulter Automatic Threading, m.d.
13"x36" LeBlond Rapid Production, Timken, latest
13"x48" Coulter Automatic Threading, m.d.
16"x6' LeBlond Rapid Production, m.d.
16"x6' bed Lodge & Shipley Simplified Mfg., cone, motorized
17"x6' LeBlond Automobile Mfg., cone
17"x8' LeBlond Rapid Production, m.d.
17"x8' LeBlond Automatic Mfg., m.d.
20"x8' LeBlond Mfg., m.d.
21"x8' LeBlond Turret Lathe, cone
Niles-Bement-Pond Quartering Machine, m.d., new
Schauer Type NA 2B Speed Lathe, m.d.

TURRET LATHES AND SCREW MACHINES

No. 2L Gisholt, m.d., latest type
No. 1H6 Libby, m.d., chucking, latest
No. 1 Cincinnati-Acme Semi-Universal, m.d., chucking, Timken
No. 1L Gisholt Universal, m.d., chucking, Timken
No. 1A Warner & Swasey Universal, chucking, pre-selector head, latest
No. 1A, 2A, 3A Warner & Swasey Universal, bar and chucking types
No. 2A, 3A Warner & Swasey Universal, chucking, Timken
No. 2B Foster Universal, m.d., chucking
No. 2F Gisholt Fastermatic, m.d., latest type
No. 2G Monsey, bar, m.d., latest
No. 2L Gisholt, m.d., chucking, standard and long bed types, Timken
No. 3 Cincinnati-Acme Full Universal, m.d., chucking
No. 3 Foster Geared Head, m.d., bar
No. 3B Foster Universal, m.d., bar
No. 3L Gisholt, m.d., chucking, Timken
No. 3L Gisholt, with cross sliding turret
No. 3 Warner & Swasey Universal, m.d., bar, latest
No. 3 Warner & Swasey Universal, m.d., chucking, latest
No. 3A Warner & Swasey Universal, m.d., chucking, latest
No. 4R Cincinnati-Acme, m.d., bar
No. 4 Gisholt Universal, m.d., chucking, Timken
No. 4 Warner & Swasey, Plain, cone, bar and chucking types
No. 4 Warner & Swasey Universal, m.d., bar
No. 4 Warner & Swasey Universal, m.d., bar, pre-selector head, latest
No. 4 Warner & Swasey Universal, chucking, as above
No. 4A Warner & Swasey Universal, m.d., chucking, latest type
No. 4A Warner & Swasey Universal, m.d., chucking, Timken
No. 4 FU Foster Fastermatic, m.d., latest
No. 5.0 Acme Universal, m.d., designed for glass bottle work, latest
No. 5 Bardons & Oliver Universal Ram Type, m.d., chucking, pre-selector head, latest
No. 5 Foster Universal Geared Head, m.d., chucking
No. 5 Warner & Swasey Universal, m.d., bar and chucking
No. 7 Bardons & Oliver Universal, m.d., chucking, late
No. 7 Bardons & Oliver, cone
2½" Jones & Lamson Universal Saddle Type, m.d., bar, latest
2½"x24", 3x36", 3½"x32", 4x34" Jones & Lamson Geared Head, m.d., bar and chucking types
3¼" Cincinnati-Acme Geared Head Flat Turret, chucking and bar types
18" Libby Type A, m.d., chucking
24", 28" Gisholt, cone
26" Libby Type C, m.d., chucking
No. 3A Warner & Swasey, electric chuck, cross sliding turret, thread chasing gear box, 941,000 serial

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Let us quote on your requirements.

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HEADLINERS

LATHES

16"x10' American 12-speed Grd. Hd., AC MIB taper
18"x12' Lodge & Shipley Selec. Grd. Hd., AC MD
18"x10' American Grd. Hd., AC MD
20"x8' Lodge & Shipley Selec. Grd. Hd., AC MIB taper
22"x10' Rockford 3 SCD DBG bowl hd.
24"x10' American Grd. Hd., AC MD
24"x12' Boye & Emmes, AC Turner Uni-Drive
24"x12' American Grd. Hd., AC MD taper
24"x14' Lodge & Shipley, Turner Drive, taper
24"x18' American Grd. Hd., AC MD, taper
30"x16' Lodge & Shipley, Lima Drive, taper

MILLERS

#2 Cincinnati H.P. Rect. O/A Plain, AC MIB, PRT, Timken
#0—6 Cincinnati "Rise & Fall," new 1942
#2—B Milwaukee DOA Plain, AC MD
#2—M Cincinnati Rect. O/A Plain, AC MIB, #50 spindle, Timken
#3 Van Norman Duplex, AC MD
Type "P" Ohio Production, heavy, new 1943
#4 Cincinnati H.P. Univ., Lima Drive, div. hd., slot attach.
#5 Cincinnati H.P. Rect. O/A Plain, PRT, AC MD

SHAPERS

20", 24", 28", 32" Gould & Eberhardt
24" American "Auto Oiled", AC MD
28" AMERICAN Hvy. Duty, AC MD
28" Cincinnati Heavy Duty, AC MD, PRT, new 1943

PLANERS

22"x22"x6' Cincinnati, 1 hd.
28"x28"x6' Cinnti., 1 hd., box table, AC MD
30"x30"x18' Whitcomb, AC MD, 2 hds.
36"x36"x18' Gray Extra Hvy. Pat., 2 hds.

RADIAL DRILLS

3½" American "Triple Purpose", AC mtr on arm
4' Morris Enclosed Head, AC MD
7' Dreses, AC MD
28" Cincinnati "Super Service" Box Col., new 1941

GRINDERS

#3 Abrasive Surface, AC MD
#22 Heald Rotary Surface, new 1943
16"x24" Landis Type C Univ. Hydr., new 1943
#2 Cinnti. Tool & Cutter, AC MD, late type
#5 Abrasive 14"x48" Surface, AC MD

BORING MILLS

36" Bullard "New Era" V.T.L.
#3A Universal Horz. ¾" bar, SPD

GEAR MACHINERY

#6—72" Brown & Sharpe Gear Cutter, AC MD
#1-H Gould & Eberhardt Hobber, AC MD
#1SH Gould & Eberhardt Hobber, AC MD
#34 Brown & Sharpe Hobber, AC MD
30" dia. x 16" face Cincinnati Hobbet, 8" dia. hole AC MD
#12 Barber-Colman Spline Hobber, 3⅛" hole, DOA, AC MD

MISCELLANEOUS

R-4-P Wiedemann Power Turret Punch, gauge 10'x⅛" Ohl Shear, AC MD
#1 Ryerson 46" Friction Saw, 25 HP AC MD
16"x21" Fay Automatic Lathe, new 1943
#1A Warner & Swasey Univ. Turret, AC MD, bar feed
#4L Gisholt Hvy. Duty Turret Lathe, AC MD, 9¼" hole, thread attach., new 1940
Torrington Swaging Machine, AC MD

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P. O. Box 1953 CINCINNATI 1, OHIO
OFFICE AND WAREHOUSE: 311-313 Bakewell St. Covington, Kentucky
Three minutes from the Cincinnati hotel district.

#3R Gisholt Turret Lathe 6¼"
#2 and #3 Warner & Swasey Turret Lathes
42" and 54" Bullard SPIRAL DRIVE Vertical Turret Lathes
12" 6-spdl. Bullard Mult-Au-Matics (2)
#32 Lucas Horizontal Boring Mill
36"x25' centers Niles Bement Pond Lathe
13"x30" centers Pratt & Whitney Lathe "B"

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St., Providence, R. I.

HEAVY SQUARING SHEARS — FOR SALE

2 Birdsboro 156"x½" Power Gap Shears, 15" Gap, Back Geared, w/extra blades.
PRICE .....$6,000.00 EA.

2 Hyde Park 156"x½" Power Gap Shears, 18" Back Geared, w/extra blades.
PRICE .....$4,750.00 EA.

EXCELLENT CONDITION
IN STOCK FOR IMMEDIATE SHIPMENT

WINSTON MACHINERY CO., INC.
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No. 15 Ferracute O.B.I. Presses.
No. 0 Manville Cold Header, D.S.S.D.
No. 2 Norton Tool & Cutter Grinder.

D. E. DONY MACHINERY CO.
47 Laurelton Rd., Rochester 9, N. Y.

LATEST TYPE *Nearly New* MACHINES

BORING MILLS—Horizontal
CINCINNATI GILBERT 3½" bar, floor type, latest
DETRICK & HARVEY 4" bar, Floor Type, M.D.
GIDDINGS & LEWIS #257, 2½" bar, Latest Type
HEALD 48, 49 single end, Borematic, Latest
GIDDINGS & LEWIS #45, 5" bar, Latest Type
LANDIS—#3—3½" bar, floor type, M.D.
LUCAS #41, 3" bar, Table Type, Latest Type
LUCAS #43, 5" bar, Table Type, Late Type
NILES BEMENT-POND 5", 6" bar, Floor Type, M.D.
UNIVERSAL 5" bar, high speed, latest type

BORING MILLS—Vertical
BULLARD 16" 6-spindle Mult-Au-Matic Type D, Latest
BULLARD 12" 6-srindle Mult-Au-Matic Type D, Latest
BULLARD 24", 36" Turret "New Era" Side Head, M.D.
BULLARD 24", 36", 42" Vert. Turret "Spiral Drive" High Speed, Latest Type
COLBURN 72", 2 swivel heads, PRT, M.D.
KING 62", 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, Rapid Traverse, AC M.D.

BRAKES—Power
CINCINNATI Series 300, ⅛"x8'6", M.D.
VERSON #300, 10 gauge x 96", Latest Type

BROACHES
AMERICAN V-2, 6 ton Hyd., Latest Type
CINCINNATI 1-30, 3-30, Duplex Vertical Surface, Hyd., Double Ram, Model ER, Latest Type
LaPOINTE 5-36 Vertical, Hyd., Latest Type

DRILLS—Miscellaneous
BARNES H-3 "Hydram," Hydraulic, 3" capacity—for inverted drilling, Latest Type
CINCINNATI BICKFORD 24" Box Column, Latest
LELAND & GIFFORD #1LM8, 4 Spindle, Latest Type
LELAND & GIFFORD #2, #2M8, Single Sedia.
LELAND & GIFFORD #2LM8 3 and 6 spindle, Latest

DRILLS—Deep Hole
BARNES 420/2 Spindle Hydraulic, Latest Type
LeBLOND #2 Single Spindle, Hydraulic, Latest Type
PRATT & WHITNEY #1Ba50", Hyd., Latest Type

DRILLS—Multiple Spindle
NATCO #4AL, 30 Spindles, Hyd., Latest Type
NATCO D-5, Adjustable, 9 spindles, Motor Drive

DRILLS—Radial
AMERICAN 4' arm 17" col. "Hole Wizard," Latest
AMERICAN 4' plain Triple Purpose, Motor Drive
AMERICAN 5' arm 17" column Plain, M.D.
CINCINNATI BICKFORD 5'13" Column, Plain, M.D
CIN. BICKFORD 6' arm 15 col. Plain or Univ., M.D
DRESSES 5' arm 15" column Univ., M.D.
WESTERN 6' arm 20" column Plain, Latest Type

GEAR CUTTING EQUIPMENT
BARBER COLMAN #12 Hobber, Single and Double Overarm, Motor Drive
BROWN & SHARPE 6-60 Gear Cutter, Motor Drive
BROWN & SHARPE #13 Spur and Bevel Cutter, M.D.
CROSS #50 Universal Gear Chamferer, Latest Type
FELLOWS 61, 61A, 65A3, 6Z2, Model Z, 7A, 7, 72, 725, 77 High Speed Gear Shaper, Latest Type
FELLOWS #12M Involute Measuring Instrument, latest
FELLOWS #18LS Lapper, latest type
FELLOWS 8M Red Liner, Latest Type
GLEASON #14 Hypoid Spiral Generator, Latest Type
GLEASON 2", 12" straight bevel generator, latest type
GLEASON #4, #6, #18 Bevel and Hypoid Tester
GOULD & EBERHARDT 12R Hobber, Latest Type
GOULD & EBERHARDT 36R Hobber, with diff. M.D
NEWARK #5 Hobber, 72" cap., Latest Type
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 3 x 12, Latest Type
LANDIS 4x12, Type H, Plain Hyd., Latest Type
LANDIS 6"x18" Type C Plain, Hyd., Latest Type
NORTON 6"x18", 6"x30", 14"x36", 10"x72" Type C, Plain, Latest Type

GRINDERS—Miscellaneous
BARBER COLMAN #3, #4 Hob Sharpener, Latest
BROWN & SHARPE No. 13 Univ. Cutter & Tool, Lat
BRYANT #16-CP-16, #24—36", Internal, Hyd., Latest
CINCINNATI #2, #4, Centerless "Filmatic", Latest
CINCINNATI "Monoset" Tool & Cutter, Latest
GARDNER 24-52" Disc Grinder, Latest
FITCHBURG 14"x25" Spline, hydraulic, latest

GLEASON #12 tool sharpener, Latest Type
HEALD 72A3, 72A5 "Garomatic." Internal Latest
HEALD 75A, 72A3, 72A5, 74, 70A Internal, latest
JONES & LAMSON 6x15, 8x18 Auto Thread, latest
LANDIS #6, 6x24 Thread, latest type
LANDIS #12 Centerless, Hydraulic, Latest Type
THOMPSON 6"x48" Auto., round broach, M.D.

GRINDERS—Surface
BLANCHARD #11, 16" dia. mag. chuck, Latest
BLANCHARD 18A Vertical, Dial Feed, Motor Drive
No-ALL Model G-7, 9"x20", Hyd., Latest Type
HANCHETT Series 300 15"x48" Vert. Hyd., Latest
HANCHETT #36, Vert., 30" dia. mag. chuck, Latest
HANCHETT #12S, 30x120" Plane, Hyd., Horiz., Latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD 25A—rotary—16" and 30" chuck, Hyd., Latest
NORTON 6x18 Hydraulic, latest type
THOMPSON 12x12x24 Type D Hyd., Latest Type

JIG BORERS
KEARNEY & TRECKER Model B Autometric, Latest
PRATT & WHITNEY 1A, Motor Drive

LATHES—Engine and Mfg.
AMERICAN 36"x360" centers, 2 carriages, motor drive
BRIDGEFORD 36"x32" bed—2 carriages, M.D.
HENDEY 12"x30" 14"x30", Timken, Latest Type
JONES & LAMSON "Fay" 20x25", 24x24 autom., latest
LeBLOND 13"x30" Centers, "Super-Regal", Latest
LeBLOND 21"x60" Centers, Geared Motor Drive
LEHMANN 14x30" centers, TIMKEN, latest type
LODGE & SHIPLEY 16"x30", 14"x30" Timken, Latest
LODGE & SHIPLEY 18x72 centers, M.D.
LUDWIG 4x60, 6x84, 8x60, 8x108, 5x24, Latest
MONARCH 10"x30" centers, Model EE, Timken, latest
MONARCH 12"x30" Centers, Model CKK, Timken, lat.
MONARCH 13"x30" Centers, Model CK, Timken, latest
MONARCH 16"x72" Centers, Model CW, Latest
MONARCH 22"x450" Centers, 3 Carriages, Timken Bearing, Model CM, Motor Drive
MONARCH 24"x84" Ball Bearing, Geared Head, M.D.
NILES 30"x60' Boring "Time Saver" Timken, Latest
PRATT & WHITNEY 16"x30" Centers, Timken, Latest
PRATT & WHITNEY 10"x30" centers, Bench, Latest
PUTNAM 42"x84" Centers, Motor Drive
REED PRENTICE 20"x54" Centers, Model A, Latest
SPRINGFIELD 14"x30" centers, Timken, latest type
WARD HAGGAR & SMITH—18/30x66" centers gap, motor drive, Latest Type

LATHES—Hob and Cutter Relieving
MICHIGAN 1708 Universal, Latest Type
MICHIGAN 1712 Universal, Latest Type
U. S. TOOL #810R, Latest Type

LATHES—Turret
BARDONS & OLIVER #5, #7, TIMKEN, Latest Type
CINCINNATI ACME No. 1 Timken, Latest
FOSTER #1FU "Fastermatic," Timken Latest
GISHOLT #1L, #2L, #3L Universal, Timken, Latest
GISHOLT #3, #4 indiv., TIMKEN, Latest Type
JONES & LAMSON #3, #5, Indiv., Timken, Latest
LIBBY "International" 1HS Univ., Timken, Latest
MOREY No. 20 No. 2, No. 4, Timken Bearing, latest
POTTER & JOHNSTON #5D2E, Timken, Latest
WARNER & SWASEY 5 Universal, Timken Bearing
WARNER & SWASEY 2-2, 2-3, Timken, Latest type
WARNER & SWASEY 3A Indiv., Timken, M.D.
WARNER & SWASEY 2A Universal, Timken Bearing, "Pre-selector" Bar and Chucking, Latest Type
WARNER & SWASEY 8A Universal, Timken Bearing, Bar and Chucking, Latest Type
WARNER & SWASEY 4A Universal, Timken Bearing, Bar and Chucking, New 1947

MILLING MACHINES—Mfg.
HALL Style L, Planetary, latest type
INGERSOLL 42"x36"x12" adj. rail, 4 heads, AC, M.D.
INGERSOLL 32x24x16" Planer Type, 2 heads, AC, M.D.
INGERSOLL 30x24x12" adj. rail sliding head, M.D.
SUNDSTRAND Model 3A Duplex 42" feed, Latest
TAYLOR & FENN M80 Duplex Spline, latest

MILLING MACHINES—Plain
BROWN & SHARPE #2, Light Type, Timken, Latest
BROWN & SHARPE #12, 24" feed, Latest
BROWN & SHARPE #000, Timken, Latest Type
BROWN & SHARPE #2B, 3B, Timken, Latest Type
CINCINNATI 0-8, 1-12, 2-18, Automatic, Latest Type
CINCINNATI #3, #4, #5, High Power, Latest Type
CINCINNATI 4-36 Hydromatic, Simplex, Latest Type
KEARNEY & TRECKER #2H, 3H, 4H, 5H, Latest
KEARNEY & TRECKER 12H, 14H, Simplex, Latest Type
KEMPSMITH #3G, #4, Timken, Latest Type
KEARNEY & TRECKER 4K, Timken Bearing, Late

MILLING MACHINES—Thread
LEES BRADNER 12"x54" Centers, Latest Type
MOREY 12x30" 60° 12pp", 19pp" centers, Latest
PRATT & WHITNEY 6"x60" centers, Model C, Latest

MILLING MACHINES—Universal
BROWN & SHARPE No. 2A, Timken Bearing, Latest
BROWN & SHARPE No. 3A, 4A, M.D.
KEARNEY & TRECKER 3H, Timken, Latest Type
KEMPSMITH #4 Maxi-miller, Timken, latest type
VAN NORMAN #2 duplex, Motor Drive
VAN NORMAN #12, #26, #36, Timken, Latest Type

MILLING MACHINES—Vertical
BROWN & SHARPE #2 Standard Timken, Latest
CINCINNATI #2, #4 Dial Type, Timken, Latest
CINCINNATI #68, TIMKEN, Latest Type
GORTON 8D, 8¼D, Super-Speed, Latest Type
KEARNEY & TRECKER 2K, 3H, Timken, Latest Type
MOREY 12M Single & Double Spindle Profiler, Latest
REED PRENTICE 3VG, with or without hydraulic duplicator, Timken bearing, Latest Type

PLANERS
BETTS (CONSOLIDATED) 84"x92"x16' 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
BETTS (CONSOLIDATED) 108"x84"x36' 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
CINCINNATI 30"x30"x8', 4 heads, PRT, DC, M.D.
DETRICK & HARVEY 48"x18"x16' 4 heads, Hydraulic, Rapid Traverse, A.C. Motor Drive
NILES 108"x84"x12' 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
NILES 42"x42"x14' "Time Saver," Box Table, 3 Heads, PRT, VARI VOLTAGE Drive, Latest
NILES 18"x18"x11', 4 Heads, PRT, Box Table, DC, M.D.

PRESSES
BIRDSBORO 325 ton, vert. hyd., Latest Type
BLISS 75-35 Hydro-Dynamic, Double Action, Latest
GLEASON 15" Quenching, Hyd., Motor Drive
HENRY & WRIGHT 50 ton Dieing, Roll Feeds, M.D.
LAKE ERIE 500 ton Vert., Hyd., Latest Type
NILES 400 ton, Horiz. wheel, Motor Drive
UNITED ENG. 500 ton, Vert., Hyd., Latest

SCREW MACHINES—Automatic
CLEVELAND 9/16", 1 1/16" Model A, Latest Type
CONOMATIC 2¾"—6 spindle, Latest Type
GOSS & DeLEEUW 6"x8¾", 5 spindle Chucker, Tool rotating, Latest Type
GOSS & DeLEEUW 8" 5 spindle Chucker, Work Rotating, Latest Type

SHAPERS & SLOTTERS
AMERICAN 26" Heavy Duty, Motor Drive
DILL 20"-24" Vertical, Motor Drive
GOULD & EBERHARDT 20", 32", High Duty, M.D.
PRATT & WHITNEY 6" Vertical, M.D.
SMITH & MILLS 16" high speed, latest type

SHEARS—Power
WYSONG & MILES 2572, 14 gauge x 6', Latest Type
QUICKWORK #5, ¾" Cap., Rotary Shear, M.D.
QUICKWORK #6, 1" Cap., Rotary Shear, M.D.

MISCELLANEOUS
AJAX 2", 3½" Forging and Upsetting, M.D.
BAKER #3 Keyseater Motor Drive
BARNES #172, 306H, 307, 307B Vertical Hone, Hyd., Self-Oiling, Latest Type
CAMPBELL #101 Abrasive Saw, Latest Type
DE LAVAL #194 Coolant Clarifier, Latest
LANDIS 2" Single and Double Spdle. Bolt Threader, M.D.
MANVILLE 20 7/16" Cap. SSSD, Ball Header, M.D.
NAZEL #4B Pneumatic Hammer, M.D.
NORTON #2F 10U Vertical Lapper, Latest Type
PRATT & WHITNEY (KELLER) Type BL-2416, Type G, Copying, 2 and 3 dimensional, Latest Type
PRATT & WHITNEY ½B 50 Rifler, Latest Type
ROWBOTTOM Cam Miller, Motor Drive

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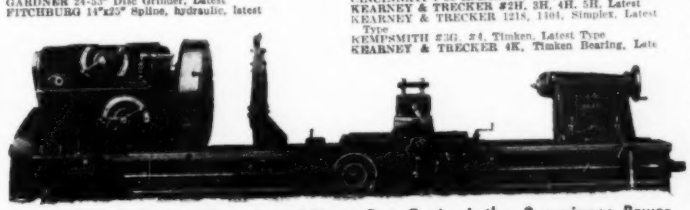
For MODERN high quality machine tools nearly all built new since 1941. These tools are priced well within your equipment budget. *Wire, write or phone for pictures, details and prices, today.*



NILES 60"x55' Centers "Time Saver" Heavy Duty Engine Lathe—2 carriages, Power Rapid Traverse with each carriage, Latest Type (NEW 1943)

Available for Prompt Shipment

(Partial List) Over 2,000 Machine Tools In Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

Most Built After 1941

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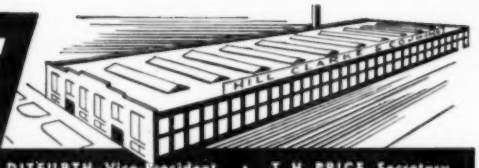

ESTABLISHED 1867 • H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary

AUTOMATICS
1⅝" Greenlee, 6 Spdls. (1941)
No. 61 New Britain 6 Spdls. 1⅝" (1942)
No. 6 Brown & Sharpe, M.D.
No. 49 New Britain, 4 Spdl. Chucker
Model A 2½" Cleveland (1943)
Model A 3¼" Cleveland (1942)

DRILLS
No. 150 Baker, tapping (1942)
No. D8 Colburn, No. 6 Morse Taper
No. 2 Foodick 4 Spdl. (1942)
No. 2 Foodick 6 Spdl. (1942)
No. 1-LMS Leland-Giffords (1942)
No. 2-LMS Leland-Giffords (1942)
No. 4BL Natco 36 Spdl. (1943)
5' Western Heavy (1942)
6'-17" Col. Fosdick Economax Radial

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 71-A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 72 Fellows Gear Shaper
No. 18H Gould & Eberhardt
72" Cincinnati Gear Cutter

BORING MACHINES
No. 350—T Giddings & Lewis 5" Bar
No. 31 Lucas, 3" bar, M.D.
No. 46-B Heald Bore-Matic (1942)
No. 112—C Excello 2 Spdl. (1942)
36" Bullard Hi-Speed (1942)
42" Colburn, M.D.
60" Colburn M.D.
72" Niles Extra Heavy
84" Betts, M.D.

GRINDERS
3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
Norton Motorized Grinders ranging from 6"x18" to 24"x240"
12"x48" Cincinnati Univ. (1947)
72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)
74 Heald Internal Gdr. (1942)
Bryant Internal Grinders (1942)
Model HRF Barber-Colman Hob & Reamer Sharpener (1942)

LATHES
14"x30" centers Pratt & Whitney, Model C
16"-18"x30" P. & W. Model C (1947)
16"x54" centers LeBlond (1941)
16"x60" centers Pratt & Whitney, Model B
18"x6' American, Gdr. Head, M.D.
19"—38" gap x 10' LeBlond
36"—48"x16' Lehman Hydratrol (1945)
36"x24' Lodge & Shipley Gdr. Head
8"x15" Sundstrand, Model D (1943)
10" Sundstrands (1942, 1943)
16" & 20" Fay Automatics (1942)
No. 4 Gisholt Univ. Turret Lathe (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Oliver (1942)
No. 5 Midland, Bar Feed (1942)
No. 1-H Libby, 6¼" Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

MILLING MACHINES
No. 2 SP Van Norman Plain (1942)
No. 2H Milwaukee Plain & Vertical (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3-V Van Norman Vert. (1942)
No. 3 Cincinnati H.P. Vertical
No. 1-18 Cin. Mfg. (1940)
No. 2—18 Cincinnati, Rise & Fall (1941)
No. 2—18" Sundstrand-Electromil (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex (1943)
No. 45-48 Cin. Hyd. Tracer (1941)
No. 56-72 Cincinnati Hydromatic
4½"x12" Pratt & Whit., Model C Thread Mill
6"x36" Lees-Bradner—Model HT (1943)
10"x48" Hanson-Whitney Thread (1942)
24"x24"x12' Ingersoll Adj. Rail Slab Miller
36"x36"x16' Ingersoll Slab Miller, 4 Hds.
No. 10 Ingersoll 72"x6' Travelling Col. Face Millers (1942)

MISCELLANEOUS
18" Dill Slotter
Micromatic Vertical & Horizontal Hydrohoners

PLANERS
36"x36"x12' Cincinnati
36"x36"x18' Gray Maxi Service, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

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Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
631 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

CLEVELAND 3¾ & 5¾ Single Spindle Automatics, New 1943, M. D., Considerable Tooling

HANCHETT Model 300 12x48 Vertical Spindle Surface Grinder, New 1943

GRINDERS
BLANCHARD #11-16" Surface, New 1944
B&S #1 Universal, Int. Spindle
CINCINNATI #2 Centerless
LANDIS 10x48 Type C Hydraulic, Plain Cylindrical
NORTON 6"x10"x36 Openside Surface
NORTON 6x18 Type C Hydraulic Plain Cylindrical
NORTON 12x36 Type C Hyd. Multi-Purpose Universal
SELLERS #6T Wet Tool

TURRET & ENGINE LATHES
GISHOLT #3R Saddle Type, Chucking
WARNER & SWASEY #3 Ram Type, Bar
WARNER & SWASEY #2 Elec. Head, Ram Type, Bar
B&S #2 Wire Feed Hand Screw, Power Feed
CARROLL-JAMIESON 15"x6' Geared Head Engine
BRIDGEFORD 36"x7' centers Geared Head Engine
MONARCH 14"x54" centers Geared Head Engine

MILLING MACHINES
B&S #2 Light Type, Plain
B&S #2 Light Type, Universal
CINCINNATI #1-12 & #1-18 Automatic
CINCINNATI #2 High Speed, Dial Type, Vertical
K&T (Milwaukee) #2HL Plain
K&T #2B Plain, Timken
VAN NORMAN #2SP Plain

MISCELLANEOUS
BUFFALO #1/2 Univ. Iron Worker—NEW
CINCINNATI 10-gauge x 6' Shear, Power Back Gauge, New 1945
LAPOINTE #3L Hor. Hydraulic Broach
LELAND-GIFFORD #1LMS 6-Spindle Drill

UNITED MACHINERY & TOOL CORPORATION
85 CENTRAL STREET **WORCESTER 8, MASS.**

CINC. 14'x1¼" (1948)
BRAKES—(Press). Cincl. 10'x⅝" (1935)
Geo. Ohl 10½'x⅜"
HAMMERS—Beard Drop, Bliss, 300 lbs.
AUTOMATICS—(2) Natl. Acme 1⅝", four spindle, Bargain.
HYDROHONER—Micromatic, Model #4H (1943)
PLATE EDGE PLANER—N. & J. 32'x2"
MILLER—Plain K. & T. #4K, Late
PLANER—N.B.P., 48"x48"x20'; 4 Heads
PRESSES—Z. & H. #7, 50 ton, Percussion
Bliss #6, 125 ton, Late
Clearing, 200 ton (1943)
Bliss #310, 450 ton

Lake Erie, 750 ton, Hydraulic, Bed 72"x148", single or double Action, late (will draw 22")

ROLLS—Bending, 30'x⅝" Pyramid
12'x⅝" Pyramid
11'x⅝" Initial

KINGS COUNTY MACHINERY EXCHANGE
408 Atlantic Ave., Brooklyn 17, N. Y.
Dept. "A" Phone: TRiangle 5-5237

PRACTICALLY NEW
Model #150 Defiance Hydraulic Horizontal Boring, Drilling and Milling Machine, Table Type.

5" diameter bar, quick change feeds and speeds, length of bed 10', working surface of table 48" x 84", Serial No. 1606-42, Mfg. in 1942.

PRICE **$17,500.00**

WILL TRADE FOR OLD STYLE CONE DRIVEN MACHINES.

ACTUAL PHOTO UPON REQUEST
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WINSTON MACHINERY CO., INC.
517 S. Delaware St., Indianapolis 4, Ind.

Bor. Mill, Hor. 4½" Bar N-B-P.
Bor. Mills, Vert. 24"-30"-42"-60"-72".
Drills, Radial, 3'-4'-5'-6' Cin.-Bick.
Grinder Surface, #2 Diamond, Mag. chuck.
Lathes, Turret, 3A W. & S., and 24" Gisholt.
Millers, Plain No. 3, 4, & 5-B Cincinnati.
Millers, Vert. No. 3 & 4 Cincinnati.
Shaper, Draw Cut, 36" Morton.
Swager, #3 Etna, 1½" tubing.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

Vertical Initial Type Roll

Capacity 10' x 1½" mild steel plate to 84" minimum diameter.

THE LANG COMPANY
"Machinery Division"
P. O. Box 479 Salt Lake City, Utah

CHECK THIS LIST OF FINE TOOLS

AUTOMATICS

½", No. 0 Brown & Sharpe
⅞" Acme Gridley model R6
⅞" & 1¼" Cone 4 spindle
1⅛" Cleveland 4 spindle
1⅝" Greenlee 6 spindle
1⅝" New Britain 6 spindle
1⅞" Conomatic 8 spindle
2"x18" Cleveland model B
2⅝" Acme Gridley model RA6
8" Bullard Multaumatic
No. 2 FU Foster Fastermatic
No. 16 New Britain 6 spdl. chucker
14"x18" Fay chucker

BROACHES

No. 1 Foote Burt duplex surface
2 ton American horiz. hydraulic
No. 3 Oilgear horiz. hydraulic
No. 10-72 Colonial horiz. hydraulic
No. 3 Lapointe screw type
10"x72" Colonial broach sharpener

DRILLS, MULTIPLE

72 spdl. Baush two way
42 spdl. No. B 16 Natco
34 spdl. No. 30 Natco
24 spdl. No. B4A Natco
22 spdl. No. 14 Natco
16 spdl. No. 2 BL Natco
12 spdl. No. 39 Natco rail
12 spdl. No. 25 Baush rail
8 spdl. No. 11 Natco

GRINDERS

No. 72A3 Heald Sizematic internal
No. 72A3 Heald Sizematic centerless
Nos. 72A3, 72A5 & 74 Heald plain
No. 75A Heald hand feed
Nos. 16A16, 16-28, 16-36, 16CP16 & 24-36 Bryant
Model MHI Sav-way hydraulic
Size IC Grenby internal
No. 2 Cincinnati centerless
No. 10 Blanchard surface
Nos. 3 & 34 Abrasive surface
9"x24" Wilmarth Morman surf.
12" & 16", No. 22 Heald rotary surf.
16" & 24" No. 25A Heald rotary surf.
24"x48" Springfield surface
No. 2 Norton universal tool
Model 4T Sellers tool
No. R6 Pratt & Whitney tool
Nos. 51 & 510 Oliver drill
No. 10G Sellers drill
Nos. 33 & 35 Excello thread

LATHES, TURRET

Model 6.2 Denver
Nos. 2 & 3 G Morey
No. 4 Midland
Nos. 5 & 7 Bardons & Oliver
No. 3 Jones & Lamson
No. 5 Foster
Nos. 2, 3, 4, 1A & 3A Warner Swasey
Nos. 3, 4, 5, 3AL & 28" Gisholt
24" & 36" Bullard vertical
No. 2 FU Foster Fastermatic
3"x36" & 4"x34" Jones & Lamson

MILLERS

No. 2H Kearney & Trecker univ.
No. 3 Cincinnati universal
Nos. 2AS, 3B & 4B Milwaukee plain
Nos. 2, 3 & 4 Cincinnati vertical
Nos. 2H & 3H Kearney Trecker vert.
No. 3V Van Norman vertical
No. 3 Kempsmith Maximill vert.
Nos. 1-12, 1-18, 2-18 & 2-24 Cint. auto
Nos. 0-8 & 2-10 Cint. Rise & Fall
Nos. 3-24, 34-36, 4-36, 4-48, 5-48, 56-72 and 56-90 Cincinnati Hydromatic
Nos. 1H-12", M18, M24 & 12-24 Kearney & Trecker

PRESSES

1000 ton Southwark hydraulic
1000 ton No. 666 Toledo coining
600 ton No. 2316½ Hamilton forging
350 ton No. F1350-42 clearing
300 ton French Oil hydraulic
48", No. 93½ Toledo double crank
Nos. P1, P2, P3, P4, P5, PGS Ferracute
No. 6 American Can OBI

MILES MACHINERY CO.
SAGINAW, MICH.

A FEW MACHINES FROM OUR LARGE STOCK

AUTOMATICS

Brown & Sharpe #00G, H.S., #4, #6, #2G (1½")
Conomatic 8 sp. 1⅞" cap.
New Britain Gridley 61—6 Sp. 2¼"

BORING MILLS

Giddings & Lewis #0, #25T, Bullard, 42" V.T.L.
Universal 3" horiz., Lucas #31 horiz.

DRILLS AND RADIALS

Cassdy-Otto 3'-9" sel.
Carlton 5'-10" sel., Foote-Burt 6 Sp.
Cincl-Bickford Super-Service 21", 24"
Natco Model E-5 Multi-Spindle, 14 spindles
Sibley 24—28", Allen 6 Sp., Excelsior 21"

ENGRAVERS

Gorton #3U, 3Z, 3L; Deckel G1.
Gorton Cutter Grinders 375-2, 285-5

GEAR EQUIPMENT

Fellows #72, 725 High Speed, Mikron Gear Hobber
Michigan, Gleason, Fellows Checkers
Gleason #2 Surface Hardener

GRINDERS—Miscellaneous

Brown & Sharpe #5 syl., 3"x18", Black Diamond
Brown & Sharpe #1, #2, #3 Univ., #13 Univ. & Tool
Cincinnati #2 Centerless Filmatic
Cincinnati Universal Filmatic, 12"x36", 12"x48"
Covel #91A Uiv. Tool & Cutter
Gardner #226, 30" disc. Heald #1 Tool
K. O. Lee Tool & Cutter.
Landis #4H Cyl. 4x12", #8 Thread, Landis Centerless
Norton #2 Tool & Cutter, Porter Cable Belt WG8
Norton Cyl. 6x30" Type C
Oliver #310 Drill Pointer, Sellers #4G
Pratt & Whitney Radius #R6, Grenby Int.

GRINDERS—Surface

Abrasive #11½" Wet, #34 Vertical, #33
Atlantis 8x18" Power Feed, Foote-Burt Hammond
Blanchard #18—42" chuck, #11—10" chuck
Brown & Sharpe #2
G. & L. #25, #35 Hyd., 6x18" & 8x24"
Hanchett #300, 13x48", Mattison 14x16x48 Hyd.
Norton 6x18" Hyd., Pratt & Whitney 12x40" Vert.
Reid #2A P.F., #2C Pope & Excello Spdl.
Thompson Hyd. 6x18x18", 6x12x18

LATHES

Bradford 18"x8', Hardinge Precision 9", cabinet
Handey G. H. 16x30 with relieving att.
LeBlond Regal 18"x3½", 15x30", 19x48", 21x60"
Lodge & Shipley 16x78" T.A., LeBlond HD 16x33"
Monarch 10"x20" EE, 16x78" T.A., 12x30" CKK
Monarch Model CKK 12x30" Dble. Compound
Rivett Precision, Logan 18"x30"
South Bend 9"x3', 9"x3½', 15x30", 10" Cabinet
Sebastian 12"x4', G.H., Sheldon 11x24, 1" collet

LATHES—Turret

Acme #6W Bar and Chuck, 6W Fox Lathe
Bardons & Oliver #3, #3, Foster #3B
Brown & Sharpe #1, #2F Hand Screw Mach.
Gisholt #4, 5 Bar & Chuck—2L Saddle type
Hardinge ESM, 2nd operation
Jones & Lamson #3A Univ., Saddle, Threading
Oster #60! Rapiduction
Warner & Swasey #3, #4, #5, #4A—9" Bar Cap.

MILLS—Plain & Universal

Brown & Sharpe #2B Pl., #2A Univ.
Cincinnati #3 Plain, 2MH Univ.
Milwaukee #2HL, 2H, Plain, #2HL, 2H, Univ.
Van Norman #12, 28, 22L, 38, Kempsmith 26

MILLS—Vertical—JIG BORERS

Brown & Sharpe #2, Index, Vernon, Bridgeport
Cincinnati #4, Jackson
Gorton #3D, 9J Plain, #8½D Duplicator
Kearney & Trecker #5N, 3N High Speed
P&W 1½B Jig Borer, Sip Jig Borer #MP-5
Moore Jig Grinder, Vernon jig borer
Moray #12M Profiler 2 sp.—Pratt & Whitney 12B

MILLS—Production

Brown & Sharpe #000, 12, 2I
Cincinnati #1-12, 1-18, 2-18 Mfg.
Nichols Hand, U.S. MM I, Kent Owens #1V
Sundstrand #00 Rigidmills, U. S. Duplex

PRESSES

Bliss #8 Dbl. Crank, Bed 42x100", 250 Ton
Bliss #675, 645B, 650 Hi-Production, 304A, 305A S.S.
Bliss #20, 21 O.B.I., #4½ Double Action Cam
Bliss #5E OB. Gap Frame #6Z, 62A, 102
Ferracute Notching #CB2
General Flexible Electric Screw Press
Henry & Wright 25, 75 Ton Dialog
Reliance 45 ton O.B.I.
Thomas 7A
V. & O. #102 Reducing.
Zeh and Hanneman 30 tons, #7 Percussion

MISCELLANEOUS

BAND SAW: DoAll V16, Tannewitz #36M, 36" Marvel #8
BENDING ROLL: Buffalo #6, Excelsior #1½
BROACH: 3L LaPointe Horiz. Hyd.
HACKSAW: Marvel #8A Automatic, #8, #4B
HONER: Micromatic #H-1 Hydrohoner, Sunnen
KEYSEATER: Mitts & Merrill, Baker, Davis, Burr
RIVET HAMMERS: HI Speed, all sizes, Chic. Pneu.
ROUTER: Onsrud #W240, #55 Oliver
SHAPER: 32" G. & E. Universal
TAPPERS: Bakewell #1, Haskins #2C, 3C
THREAD ROLLER: Waterbury-Farrel #30 with Dies
VERTICAL SHAPER: 6" Pratt & Whitney
WELDERS SPOT & SEAM: Taylor Winfield, Eisler 50 KVA
WRAPPING ROLL: Buffalo #½

HYDRAULIC EQUIPMENT

Cap.	Manufacturer	Platen	Stroke	Opening
500 Ton	Lake Erie	35x36"	36"	60"
600	Bald. B'thw'k	70x36"	22"	30"
500 D.A.	H.P.M.	36x36"	24"	30"
1000	French Oil	53x42"	36"	59"
350	Verson	40x40	36"	72"
50	Dennison	22x20	18	23
150	Southwark	34x30	30 2' to 4'	

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3000 Ton Tryout and Hobbing
300 Ton Watson-Stillman Hobbing, NEW.
600 Ton Birdsboro 42x32 platen—20" stroke
800 Ton Birdsboro 40x32 platen—20" stroke
800 Ton Birdsboro 40x32 platen—20" stroke
600 Ton Southwark 34x23 platen—20" stroke
100 Ton Stokes self contained Molding
300 Ton Dunning and Boschert Molding Press
300 Ton Watson-Stillman 24x20 platen—8" stroke
500 Ton Self contained Shaft Straightener.
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Moline 6-Sp. Hole Hog Drill. Barnes 4-Sp.
20" All Grd. Camel Back Drill
Cin.-Bick 3' & Morris 3½' Arm Radial Drills
Do-All 8 x 24" Horiz. Sp. Hydr. Surface Grinder
Blanchard M.D. Vert. Sp. Surface Grinder 26" chuck
L & S 20" x 8', 18" x 12', 20" x 10', 28" x 12'
Axelson 20" x 12', Hendey 14" x 6', Amer. 12" x 6'
Monarch 20" x 8', Amer. 26" x 12' grd. hd. q.c.g. m.d. Engine Lathes
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B & S No. 2-A & 3-A, Mil. No. 2-B, Cin. No. 1-M, Cin. No. 2, Grd. Hd. Univ. Millers
Cin. 36" M.D. Univ. Shaper, G & E & Amer. 24" Shapers
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36" & 42" King Side Hd. Vert. Mills, '43
Nos. 1A & 3 W. & S. Turrets, bar & chuck
Nos. 3 & 2MH Cinci. Pl. Dial Millers, late
Nos. 3E & 3H K. & T. Pl. Dial Millers, late
No. 3G Van Norman Pl. Miller, ram, '43
No. 2G Kempsmith Univ. Miller, 1943 (3)
No. 2416 Keller Duplicators, late
No. 9J Gorton Dupplicator & Vert. Miller (2)
12"x24" G. & L. No. 45 Surface Grinder, '42
No. 70A Heald Internal Grinder, 1942
Gear Cutter, No. 13 B. & S., spur & bevel
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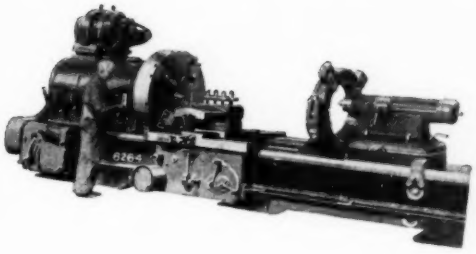

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W & S #3 Ram Type Universal—1½" cap. —bar & chucking.

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16" Bullard Mult-Au-Matic, 6 spdl. 1941.
1¾" Greenlee, 6 spindle. 1942.
⅝" RA-6 Acme-Gridley. 1942.
No. 60 New Britain, 1" cap. 1943.

BORING MACHINES

No. 42 Lucas Horizontal. 1940.
No. 54 Excello Double End. 1940.
No. 46B Heald Single End. 1940.

DRILLS

3'9" Morris "Mor-Speed." Latest.
25" Fosdick "Economax." 1941.
No. 217 Baker box column. 1942.

GEAR EQUIPMENT

3" & 12" Gleason Generators. 1941.
No. 6 & 17 Gleason Testers. 1943.
12" Red Ring Internal Shaver. Late.
No. GCL-3 Red Ring Shaver. 1942.
No. 624A3 Fellows Side Trimmer. New.
No. 615A & 61A Fellows Shapers. 1943.
No. 7125A & 712 Fellows Shaper. 1943.
Vinco Spline & Gear Grinder. 1942.

GRINDERS, CYLINDRICAL

16"x36" Cincinnati Plain. 1942.
12"x48" Cincinnati Univ. 1943.
10"x72" Landis Plain. 1942.
10"x18" Norton Plain. 1942.

GRINDERS, INTERNAL

No. 74 Heald Ext. Bridge. 1941.
No. 72A3 & A5 Heald Plain. 1944.
No. 5 & 16A22 Bryant. Latest.

GRINDERS, SURFACE

12"x16"x60" Thompson Hyd. Latest.
No. 22 & 25A Heald Rotary. 1943.
No. 2-1 Reid, 6"x18" cap. 1940.

LATHES, ENGINE

45"x192" Axelson. 1942.
28"x276" Bertram. 1942.
24"x168" Sidney. 1942.
18"x54" Lodge & Shipley. 1943.
18"x48" Bradford. 1942.

LATHES, PRODUCTION

Gisholt "Simplimatic." 1940.
No. 3A L&S "Duomatic." 1943.
No. 2FU Foster "Fastermatic." 1943.
20"x97¾" LeBlond Rapid Prod. 1941.
8"x108" Lo-Swing Semi. Auto. 1942.
Model 8, 10 & 12 Sundstrand. 1942.
14"x42" Monarch "Magna-Matic." 1941.

LATHES, TURRET

36" Bullard Vertical. 1943.
No. 2A & 3A Warner & Swasey. 1943.
No. 1 & 8⅛"x24" Acme Univ. 1943.
No. 2, 3 & 4 Warner & Swasey. 1943.
No. 3, 5 & 7 Bardons & Oliver. 1942.

MILLS, PLAIN

No. 5 Cincinnati. 1943.
No. 4 Cincinnati Dial Type. 1942.
No. 4H & 4K Milwaukee. 1943.
No. 3 Van Norman. 1942.
No. 2HL Milwaukee. 1942.

MILLS, PRODUCTION

BL-2450 P&W "Keller" 3 sp. 1942.
BL-2416 P&W "Keller", 1 sp. 1943.
BG-1 Keller, single spdl.
No. 1-14 & 2-20 Kent Owens. 1942.
No. 1248 Kearney & Trecker. 1942.
No. 1-18, 2-18 & 2-24 Cincinnati. 1942.

MILLS, THREAD

6"x60" Pratt & Whitney. Latest.
12"x54" Lees Bradner. 1943.
4"x9" Hanson Whitney. Late.

MILLS, UNIVERSAL

No. 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 2SU & 2GSU Van Norman. 1942.

MILLS, VERTICAL

No. 3B P&W Univ. Die Sinker. 1943.
No. 2K & 3H Milwaukee. 1942.
No. 2 & 3 Cincinnati. 1942.
No. 1 Cleveland. 1942.

PRESSES

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SUNDSTRAND: #96 Rigidmil Duplex (arr. for milling propeller hub cams or similar work)
SUNDSTRAND: #00 Rigidmil Hydraulic
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BRIDGEPORT: Vertical Turret
MOREY: 12M Profiler, 2 Spindle.
TAYLOR-FENN: M-00 Duplex—Keyway
RICE BARTON: Model "K" Duplex—Keyway

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HANSON-WHITNEY: 8"x10" Thr'd Millers
LEES-BRADNER: 40A Thr'd Miller—Ch'kg
MOREY: 12"x50" Thr'd Miller
HALL PLANETARY: Type C & B Thr'd Millers
KAUFMAN: 5A Tapper—2 Spindle Heads
MURCHEY: #22 Tapper Horiz.

GRINDERS — THREAD

EXCELLO: #31 & 33 External
JONES & LAMSON: 6"x30", 12"x45" External. TG-125 Internal

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LANDIS: 18"x18" C, 6x18 C, 4x12 H, Hydr.; 18"x32" D Crankpin.
CINCINNATI: 6x18 Hydraulic
BROWN & SHARPE: #10 & #5 Plain
NORTON: 12"x30" C Universal

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HEALD: #22x12" chuck Rotary
ARTER: A-1-8-12" chuck Rotary
GARDNER: 1-29A Opposed Head, Disc Grinder

GRINDERS — INTERNAL

HEALD: 72A5 & 72A3 Plain, Fixed or Cross feed work head
HEALD: 72A3 Universal T-Bed
HEALD: 72A5 Sizematic
HEALD: 172 Sizematic—Gap Bed
HEALD: 72A3 Sizematic Centerless
BRYANT: 24-36; 16-28 Hole Grinders
BRYANT: #112 Universal Hydraulic
RIVETT: #104 Universal Tool Room

GRINDERS — RADIUS

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MICROMATIC: Model 200 D.E.; Model H2 S.E. Hydrohones

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CINCINNATI: #2 Centerless
ULTRA-LAP: #10 Lapping

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PRATT & WHITNEY: 18" Single Wheel—Spur and Helical
GEAR GRIND. MACH. CO.: GG-33 & GG-10 Spur Gear & Spline
GLEASON: #17 For Spiral, Zerol & Hypoid Bevel Gears

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FELLOWS: #61, #72, #7 Gear Shapers
FELLOWS: Straight Line Fine Pitch Generator
FELLOWS: Model "2" Gear Shaper Horiz.
GLEASON: 3" Straight Generator

GEAR FINISHING & TESTING

FELLOWS: #8LSI & 13LSI Lapping machines
FELLOWS: #12 Shaver—Crowning Attachment
GLEASON: #4 & #6 Bevel Gear Testers
GLEASON: #13 Universal Tester
ILLINOIS: #224 Involute Checkers
MICHIGAN: #1124 Involute Checker
NATIONAL BROACH: SIC-12" Tester

PRECISION BORING

HEALD: 48A & 47A S.E. 2 spindle; 49A D.E. 4 spindle Borematics.

LATHES — PRODUCTION

GISHOLT: 4F & 2F Fastermatics
POTTER-JOHNSTON: 5D Automatic
LODGE & SHIPLEY: 5A Duomatic
LIPE-ROLLWAY: 15"x30" Carbomatic
MICHIGAN TOOL: 10"x26" Relieving Univ.

TURRET LATHES & AUTOMATICS

WARNER & SWASEY: 3A Turret Bar Feed
GISHOLT: #3 & 5 Turret Lathe, Bar & Chuck
ACME-GRIDLEY: 1" RA6 Automatic
CONE: 1⅞" 6-Spindle Automatic
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Millions of pounds of brass rod are manufactured in our mills each month. Shipment can be made at once from our large factory stocks.

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PORT HURON, MICHIGAN

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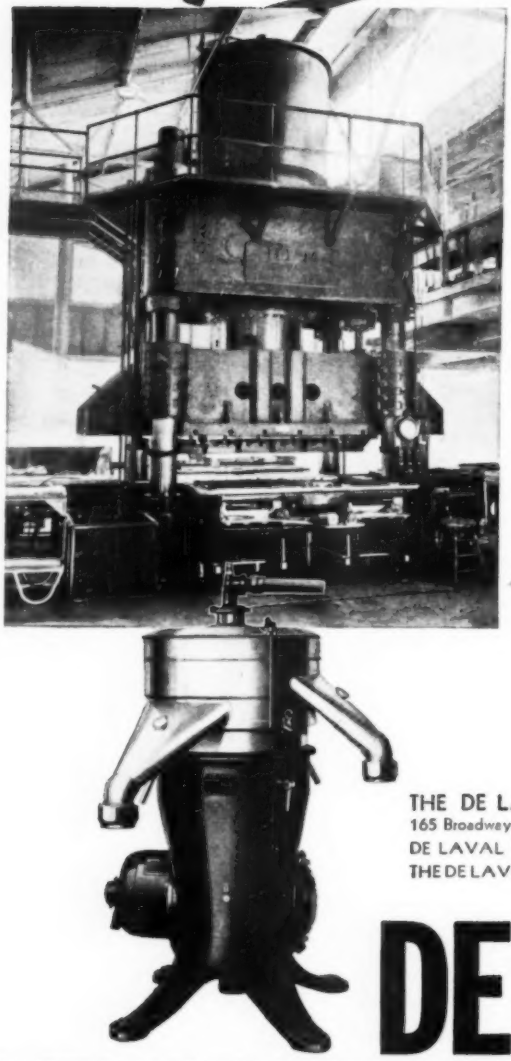

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HARDENED AND GROUND STEEL BED WAYS?	YES			
ONE-PIECE APRON WITH POSITIVE JAW FEED CLUTCH, AUTOMATIC LUBRICATION?	YES			
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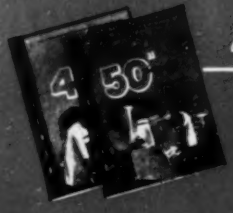

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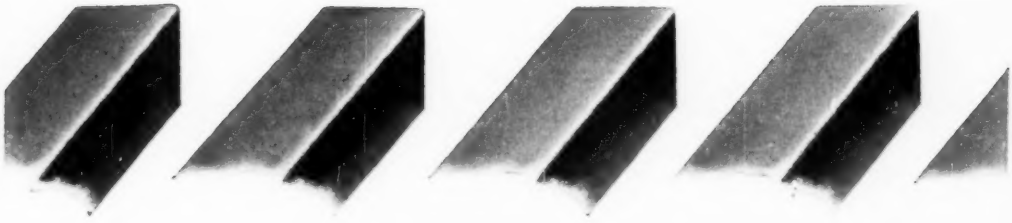

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